

The University of Hull

THE ARGUMENT FROM DESIGN

WITH SPECIAL REFERENCE TO PALEY AND DARWIN

AND ITS SIGNIFICANCE FOR CONTEMPORARY CHRISTIAN APOLOGETIC

being a Thesis

submitted for the Degree of Doctor of Philosophy

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by

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Summary of Thesis submitted for Ph.D. degree

by David Norman Samuel, B.A., (Wales), M.A.

on

The Argument from Design

with special reference to Paley and Darwin

and its significance for contemporary Christian apologetic

The purpose of this thesis is to examine the nature of the Design Argument both historically and philosophically, to compare and contrast it with the Darwinian theory of evolution which resulted in the demise of the Argument in the nineteenth century, and to assess the significance it can still conceivably have for Christian apologetic today.

The thesis begins with an examination of Paley's presentation of the Argument in his Natural Theology, and an assessment of its strengths and weaknesses in the light of later developments of thought. This is followed by a statement and appraisal of the philosophical criticism to which the Argument was subjected by Kant and Hume. It is argued that the popular view that these critiques inflicted irreparable damage on the Argument appears to be mistaken.

The continuing role of the Argument in natural theology in the nineteenth century is traced through the Bridgewater Treatises and the contribution the writers of these treatises made to the elaboration of Paley's central thesis. The changes that began to come about in the 1830s and 1840s with regard to the view of the development of life on earth and the significance this had for the Argument from Design are discussed in relation to the advent of Lyell's uniformitarianism and the Vestiges of Creation.

The special bearing that Darwin's theory of organic evolution had upon the Argument from Design is considered at length. In particular the affinities, both psychological and philosophical, which are deemed to exist between the structure and the character of the two arguments are brought out. The role of

the imagination in the development and presentation of Darwin's metaphysical ideas is seen to be of primary importance, and as something which links his theory closely in character and structure with the Design Argument. This also suggests that the two arguments function in a similar way. However Darwinism, it is argued, is fundamentally incompatible with teleology and this is seen in the failure of apologists on both sides to unite them.

The final chapters are concerned with showing, in the light of the foregoing analysis, how a teleological view of the world and man may still be regarded as valid, and the place this fresh appraisal of the Design Argument might afford it in Christian apologetic today.

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"... It is by frequent or continued meditation upon a subject, by placing a subject in different points of view, by induction of particulars, by variety of examples, by applying principles to the solution of phenomena, by dwelling upon proofs and consequences, that mental exercise is drawn into any particular channel. It is by these means, at least, that we have any power over it. The train of spontaneous thought, and the choice of that train, may be directed to different ends ...

... if one train of thinking be more desirable than another, it is that which regards the phenomena of nature with a constant reference to a supreme, intelligent Author. To have made this the ruling, the habitual sentiment of our minds, is to have laid the foundation of everything which is religious."

(William Paley, Natural Theology, Ed. F. Ferré, p.84)

"... I feel pretty sure, from my own experience, that if you are led by your studies to keep the subject of the origin of species before your mind you will go further and further in your belief".

(Charles Darwin in a letter to Asa Gray, 1st February, 1860,
Life and Letters of Charles Darwin, II, p.273, Ed. F. Darwin)

"No one ... will deny that it is at the level of the imagination that contemporary Christianity is most weak. Men find it hard to believe in God because they do not have available to them any lively imaginative picture of the way God and the world as they know it are related".

(Dennis Nineham in The Myth of God Incarnate, Ed. John Hick, p.201)

INTRODUCTION

There are a number of reasons why the design argument should be reconsidered at present. In the first place there is the comparative neglect from which it has suffered in recent times, by which I mean that during the greater part of this century it has received little attention. This is probably due to the fact that there is a general feeling abroad that the argument no longer carries conviction and that since Darwin such a position has become untenable and irrelevant.

This is all in strange contrast to the popularity and prominence the argument once enjoyed, and the resilience it proved to possess in the face of doubts and criticism, for though it was at times suppressed by opposing views, yet it was never wholly eclipsed. It is also strange that the argument should be so little employed today by those of a religious persuasion when there is such a wealth of illustrative material available through the advance of science into the realms of microscopy and molecular biology. Modern science seems to be bringing us back to design and confronting us with it as an ultimate, unexplained datum. On the face of it there would appear to be abundant material for popular exposition of the argument. Programmes about nature and science on television are generally well received, but almost invariably they evoke an understanding of the complex harmony and design exhibited in nature as having been brought about in an accidental way.

Here is a great opportunity for an opposite view of nature to be expounded, but it cannot be done until, and unless, there is the conviction that such a view of nature, as rationally ordered and intelligently designed, is both permissible and legitimate. This is where an examination of the presuppositions and principles underlying the design argument, and the alternative view of the world which stems from Darwinism, is needed and may serve to remedy the neglect of recent years.

The history of the robust nature of the argument would suggest that its role is not relegated to the past. It is awaiting reinstatement at the hands of those who are convinced of the relevance and force of the argument.

A reappraisal is at present taking place of Darwin's theory of evolution by natural selection and its implications. The adequacy of the theory is being seriously questioned from within the scientific establishment itself. There is growing uncertainty and agnosticism about the mechanism of descent. While there is no doubt that natural selection does take place, it is being questioned whether it is capable of producing new species and can explain the order and form of the whole organic world, as Darwin claimed. This, of course, reopens the question that Darwin was deemed to have settled. It casts doubt upon the comprehensive world view that his theory evoked of all life having derived from some single form, or at most some few forms. If natural selection is not competent to explain the order and purpose we perceive in nature, what is ?

The significant thing about the current debate is that the consensus about evolution which has prevailed very largely since Darwin's time is being broken up. Where this happens there is always the possibility of a new way of looking at things emerging, even if that new way proves in the end, like most changes of a philosophical nature, to be the reintroduction of ideas which were common in a previous age.

But not only has the argument from design been neglected in recent years, it has also been the subject of misunderstanding, which has no doubt contributed to its neglect. It has been laid aside because it was thought to conflict with science. This is not the case. It conflicts not with science but with scientism, with a metaphysic which is adopted, sometimes by scientific men but equally by those who are not scientists, which attributes the world and human existence to chance, to the blind operation of natural forces. This is the elevation of a principle which we find at the heart of Darwinism - natural selection acting upon random variation - into a philosophical world view. It is not itself scientific, but in the popular mind it is often regarded as being a scientific position. It is this world view

which conflicts with the design argument representing, as it does, a wholly different understanding of the universe and human existence. It is the author's opinion that a proper examination of Darwin's views, scientific and metaphysical, and a recognition of the distinction between them, will help to resolve the confusion and rehabilitate the design argument as a legitimate and even necessary position, since it can be argued that certain psychological and philosophical constraints require us to view the world and its parts as designed. It is important also that this examination should be seen against the broad background of the history of the argument, particularly in the period which immediately preceded Darwin, so that it may be related to the contribution of other great minds to the subject. In this way the distinctions and judgments which we need to make can more readily be discerned and drawn out.

Lastly, there is the question of the importance of the design argument for contemporary Christian apologetic. The communication of religious concepts, such as those contained in the Christian Gospel, presuppose some kind of theistic consciousness on the part of those to whom they are communicated. This is lacking in a broadly secular a-theistic society such as we encounter in Western civilization today. Modern man lacks an understanding of God and, more particularly, how such a God is related to the world and human existence. This is the road along which religious ideas must travel. If it has become impassable because of neglect and obstruction, the way must be cleared and communication restored. A hundred years ago Charles Kingsley wrote, "If in any age or country the God who seems to be revealed in nature seems different from the God who is revealed by the then popular religion, then that God, and the religion that tells of that God, will gradually cease to be believed in." ¹ Kingsley was challenging many of the theological assumptions of his day which were unfavourable to science, and calling for adjustment on the religious side if the nemesis he predicted was to be averted.

1. Charles Kingsley, Scientific Lectures and Essays (1885), 314

Today, in order to redress the balance, we may legitimately question some of the so-called scientific assumptions of our age, which hold nature and religion apart, and call for an adjustment which will restore communication between a view of the world as divinely created and a popular scientific understanding of it. The argument from design is uniquely fitted to fulfil this role and this makes its study and exposition a matter of great importance and relevance at the present time.

W I L L I A M P A L E Y A N D T H E D E S I G N A R G U M E N T

We begin our consideration of the design argument with the work of William Paley, the great Anglican divine of the eighteenth century, for several reasons. The first is that the argument was given classical and memorable expression in his writings. Whenever the question of this 'proof of God's existence' is mentioned it is Paley's name which springs to mind, together with the analogy of the watch with which he begins the argument in his Natural Theology, though he was indebted to the Dutch philosopher Bernard Nieuwentyt (1654-1718) for this idea.¹ It is true that there is very little that is original in Paley's work, but this does not appear to have detracted from its importance. His great virtue was clarity of thought and the telling use he made of many of the familiar and commonplace ideas of eighteenth century Christian apologetic. He conceived of this apologetic as a whole - as a system both of natural theology and of revelation - and laboured to complete it, which he did, finishing strangely enough with his work on natural theology shortly before his death. From the mass of popular argument and apologetic to which the argument from design gave rise in the seventeenth and eighteenth centuries Paley was able to abstract what was best, and concentrate it in a relatively small compass. Hence his great importance. Standing as he did at the zenith of this period, Paley gave the fullest expression to the design argument, and, although it ran on into the nineteenth century until it was checked by Darwin and the doctrine of natural selection, very little of significance was added by later expositors.

1 Objection has been made that Paley borrowed the general plan and argument of his Natural Theology without acknowledgment. This allegation was first made in the Athenaeum for 1848 by a writer who pointed out that a work by Bernard Nieuwentyt, a Dutch physician and mathematician, who lived from 1654 to 1718, had served as the basis for Paley's Natural Theology. Nieuwentyt's work entitled The True Uses of the Contemplation of the Universe was written in Dutch and first published in Amsterdam in 1715. It was translated into English by J.T. Desaguliers and published under the title The Religious Philosopher (2 Vols. Third Ed. 1724). The famous watch analogy begins thus in Nieuwentyt's work, "Let us suppose, that in the middle of a sandy down, or desert (sic) and solitary place, where few people are used to pass, any one should find a watch ..." (p. xxv).

While the objection against Paley can clearly be sustained, it appears that Nieuwentyt himself borrowed ideas and arguments without acknowledgment from an earlier work by Robert Boyle on the subject entitled A Disquisition about the Final Causes of Natural Things, published in London in 1688.

Beginning as we do, however, with Paley we must not forget that the design argument is very ancient. Perhaps its earliest form is found in Stoic philosophy, which described the strongest ground of theistic belief as one which is drawn from the regularity of the motion and revolution of the heavens, the distinctiveness, variety, beauty, and order of the sun, moon, and all the stars, the appearance only of which is sufficient to convince us they are not the effects of chance.

When we see some example of a mechanism, such as a globe or a clock or some such device, do we doubt that it is the work of a conscious intelligence? So when we see the movement of the heavenly bodies, the speed of their revolution, and the way in which they regularly run their annual course, so that all that depends upon them is preserved and prospers, how can we doubt that these too are not only the works of reason but of a reason which is perfect and divine.¹

But the Stoics not only appealed to the heavens as evidence of design. They also pointed to organic nature.

When we Stoics say that the universe is formed and governed by nature, we do not mean that it is just stuck together mechanically, like a lump of earth or a piece of stone or something of that sort, but organically, like a tree or an animal, in which there is nothing haphazard but an appearance of order which is akin to art.²

The design argument also occurs in the fifth of Aquinas' 'Five Ways', but its greatest flourishing was undoubtedly in the seventeenth and eighteenth centuries. Robert Boyle's book A Disquisition about the Final Causes of Natural Things (1688) was the precursor of a genre. He considered that the prejudice which existed against final causes on the part of Descartes was due to the excesses of medieval School philosophy which regarded everything in the world as serving the benefit of man. We may not pretend to know all the ends of God in creation for that is presumption, but we may know some of those ends for that is legitimate.

1 Cicero, The Nature of the Gods, Book II, 163

2 Ibid. 156

"The rejection of Final Causes from the consideration of Naturalists, tends much to weaken ... if not quite to deprive us of, one of the best and most successful Arguments, to convince Men, that there is a God".¹ His book embraced an account of both inorganic and organic nature, but particularly the latter ... "There is incomparably more Art express'd in the structure of a Doggs (sic) foot than in that of the famous Clock of Strasburg".²

John Ray published in 1691 his book entitled The Wisdom of God Manifested in the Works of the Creation. Ray also attacked Descartes' insistence upon excluding final causes from the study of nature. Without the proof of design in creation we are left only with the proof of the innate Idea, which is but a very obscure demonstration of the existence of God.³ He recognised the place of secondary causes in the Divine plan, and termed it Plastic nature, a principle or medium that God uses for the creation of things, so that he is not immediately involved. While there is analogy between Art and the works of nature there is also a contrast, for the microscope shows up the greatest perfection of nature the deeper we delve, whereas the same examination exposes the crudeness of human art.⁴

William Derham's Physico-Theology or a demonstration of the Being and Attributes God from His Works of Creation appeared in 1713 and followed the now emerging pattern of a survey of the phenomena of nature and the current state of science in relation to them, concluding with an appeal for the acknowledgment of the Creator in his works.

1 Robert Boyle A Disquisition, 32

2 Ibid., 47

3 John Ray, The Wisdom of God, 22

4 Ibid., 41

Paley begins his argument with the comparison of the watch and the stone:

In crossing a heath, suppose I pitched my foot against a stone and were asked how the stone came to be there. I might possibly answer, that, for anything I knew to the contrary, it had lain there for ever; nor would it perhaps be very easy to show the absurdity of this answer. But suppose I had found a watch upon the ground, and it should be inquired how the watch happened to be in that place; I should hardly think of the answer which I had before given - that, for anything I knew, the watch might always have been there.

And the reason, he remarks, for this difference is that with the watch "we perceive (what we could not discover in the stone) that its several parts are framed and put together for a purpose".¹ It is clear from the context that Paley is not merely interested in order in nature, but in order which expresses purpose, or, to put the matter another way, he is concerned not with mere design, but teleological design. It is for this reason that he declares very much later in his work that the order of the solar system is not the best constituted for the argument for the existence of an intelligent creator:

We deduce design from relation, aptitude and correspondence of parts. Some degree of complexity is necessary to render a subject fit for this species of argument. But the heavenly bodies do not ..² present themselves to our observation as compounded of parts at all.

Paley's examples and illustrations were, therefore, drawn primarily from organic nature, because here he discerned what he regarded as being the necessary complexity, relation and correspondence of parts which were indicative of teleological design and conformed best to the analogy of the watch and its parts which was the basis of his argument.³

1 William Paley, Works (1838), 25

2 Ibid., 145

3 "Tho' the Heavens do show wonderful symmetry and order, yet I cannot but think, that the Situations of the Coelestial Bodies do not afford by far so clear and cogent Arguments, of the Wisdom and Design of the Author of the World, as do the bodies of Animals and Plants." Robert Boyle, A Disquisition (1688), 43

Returning then to the watch, the inference is inevitable that it must have had a maker. He now anticipates and answers certain objections to this conclusion which he knew were current at the time, and, although he never once mentions David Hume by name, yet it is clear that some of the sceptical arguments employed by him in his Dialogues concerning Natural Religion are being countered here. First, the fact that the workman or process is unknown to us does not invalidate the conclusion. The artifacts of previous civilizations, which have now disappeared, convey the idea of design even if we are not familiar with the author or the process by which they came into being. Secondly, even poor workmanship is evidence of a worker; if the watch sometimes went wrong, or only occasionally went exactly right, it would not destroy the argument for a designer. Nor would the existence of parts which we did not recognise as contributing to the general effect. Next he comes to the criticism that we find in Hume's Dialogues, that randomness can be made to account for such design. It may not, of course, be excluded logically, but the appeal to it is arbitrary when another explanation altogether more familiar, reasonable and compatible with the facts to be explained is available:

Would any man in his senses think the existence of the watch ... accounted for by being told that it was one out of possible combinations of material forms, that whatever he had found in that place where he found the watch, must have contained some internal configuration or other ... ?

Nor would it give him any satisfaction to be told that there exists in things a principle of order:

He never knew a watch made by a principle of order; nor can he even form to himself an idea of what is meant by a principle of order distinct from the intelligence of the watchmaker.

"He would be surprised to hear that the mechanism of the watch was no proof of contrivance, only a motive to induce the mind to think so."¹ It would also surprise him to be told that the watch was the product of "the laws of metallic nature"

¹ William Paley, Works, 27

It is a perversion of language to assign any law, as the efficient operative cause of anything. A law presupposes an agent; for it is only the mode according to which an agent proceeds; it implies a power; for it is the order according to which that power acts. Without this agent, without this power, which are both distinct from itself the law does nothing, is nothing. The expression 'the law of metallic nature' may sound strange and harsh to a philosophic ear, but it seems quite as justifiable as some others which are more familiar to him, such as 'the law of vegetable nature', 'the law of animal nature', or, indeed, 'the law of nature' in general when assigned as the cause of phenomena in exclusion of agency and power, or when it is substituted into the place of these.¹

Here we meet with a trenchant criticism of Hume's 'generation' hypothesis, which he put forward as an alternative to the design argument in his Dialogues, and to this we shall return later. But it is worth remarking here that this criticism is equally effective in exposing a confusion that was to arise later in Darwin's thought. Darwin introduced into the theory of evolution the idea of 'natural selection'. It was, he asserted, a law of nature; but it is clear from the use he makes of it that it meant much more than this in his system. The 'law' was unconsciously transformed into the operating agency or power.

We must suppose that there is a power, represented by natural selection or the survival of the fittest, always intently watching each slight alteration in the transparent layers [of the eye]; and carefully preserving each which, under varied circumstances, in any way or in any degree, tends to produce a distincter image ... natural selection will pick out with unerring skill each improvement. Let this process go on for millions of years; ... and may we not believe that a living optical instrument might thus be formed as superior to one of glass, as the works of the Creator are to those of man?²

Darwin confuses the two ideas which Paley rightly insists must be kept logically distinct - law and agency or power.

Finally, says Paley, the man who finds the watch on the heath and concludes that it has an intelligent maker will not be driven from his conclusion by being told that he knows "nothing at all about the matter. He knows enough for his argument" and "the consciousness of knowing little need not beget a distrust of that which he does know".³

1 Ibid., 27,28

2 Charles Darwin, The Origin of Species (Sixth edition), 137

3 William Paley, Works (1838), 28

II

Next Paley deals with the problem that is raised by the power of natural reproduction in living organisms. If the designed object were capable of reproducing itself, it might be supposed that a designer was no longer necessary, but that an 'infinite regress' of reproductions could account for the marks of contrivance. However, as Paley points out, increasing the number to infinity so that you dispense with the necessity for a first in the series does not dispose of the problem, viz., how do we account for design or purpose in what we see? ¹ It may be conceded that Paley's analogy of a chain whether with a finite or infinite number of links equally requiring support is not very apt. "Does the whole", as Frederick Ferre' points out,

if infinite even constitute something that needs support? ... would it make sense to ask whether a really infinite chain (per impossibile) were supported or falling? Would there be any difference between a "supported" and a "uniformly falling" infinite chain, if that chain constituted all reality? ²

The ineptness, however, of his analogy does not destroy the force of the argument.

• The resort to infinite regress is not an explanation of design, but rather an evasion or rejection of such an explanation, and indeed of every explanation.

The mind cannot remain content with this, and it poses a threat both to scientific and metaphysical enquiry. Allowing that there is evidence of design in the object before us, it is no answer to the question of how that design came about to assert that a preceding object, which was similar to it in all respects, produced it, for then the question simply recurs. Taking the problem further and further back does not lead to a solution, except where, as Paley himself acknowledged, there is an approach to a limit, for then by extending back far enough the limit is reached. But where there is no such tendency nothing is achieved by lengthening the series.

1 Ibid., 30

2 Frederick Ferre', Introduction to Paley's Natural Theology (1963), xxiii

It might appear, at first, as if the Darwinian hypothesis overcame this difficulty. Paley shared with most of his contemporaries a belief in the immutability of species, that none had changed since they were created, indeed, that none had become extinct and disappeared. Darwin's evolutionary theory, however, introduced a plasticity into organic nature, and traced a development from the simple to the more complex forms of life. It might, therefore, be assumed that the theory of evolution introduced a "tendency to a limit", that as we trace the matter further and further back so the problem of design in nature should tend to vanish until one is confronted with primitive 'simples', or elements that reveal little or no design.

It is far from clear that the problem can be resolved as easily as that. It was no doubt the case that in the state of biological science which prevailed in the last century some such scheme as this appeared plausible. But more recent investigation of the structure of living cells has revolutionized this understanding of things. "Above the level of the virus", wrote G.G. Simpson in the 1940s,

if that be granted status as an organism, the simplest living unit is almost incredibly complex. It has become commonplace to speak of evolution from ameba (sic) to man, as if the ameba were a natural and simple beginning of the process. On the contrary, if ... life arose as a living molecule or protogene, the progression from this stage to that of the ameba is at least as great as from ameba to man. All the essential problems of living organism are already solved in the one-celled (or as many now prefer to say, noncellular) protozoan¹, and these are only elaborated in man or the other multicellular animals.

All that has happened since then has only served to increase our wonder and surprise at the complexity and intricacy of design of even the 'simplest' form of life. Now with the aid of the electron-microscope, which can enlarge a penny to the size of a city, scientists can see that every cell and every organism is more complicated than the most complex machine ever built by man.

1 G.G. Simpson, The Meaning of Evolution, 16

All the cells that we know are of fantastic complexity. I believe that no biologist or physicist has yet been able to propose even the outlines of a theory as to how such a cell might have been 'evolved'. 1

There was, then, something defective in the mythology of early evolution which led its exponents to assume that the history of living matter could be traced back, at least in theory, to the primitive and simple single cell which revealed little or no evidence of design and disposed of the question raised by more complex organisms. Even here, it now appears, the ubiquity of design is encountered, and on no less a scale in the microcosm than the macrocosm. Paley's criticism would still seem to have force. Taking the problem further and further back does not tend to a solution. Only where there is an approach to a limit can this be of assistance. But just when it was believed that such a limit was attainable it was found to be illusory, and the question is posed afresh. How do we account for the design in what we see? 2

Paley's application of the design argument begins with the example of the eye, perhaps the most wonderful of all the organs of the animal body, and which has held a central place in the discussion of this subject both before and since Paley's time. Darwin offered a tentative evolutionary account of the development of this organ, but not without many and deep misgivings. He acknowledged that, "the belief that an organ so perfect as the eye could have been formed by natural selection is enough to stagger any one", although it is no "logical impossibility". 3

1 W.H. Thorpe, Purpose in a World of Chance (1978), 21

2 In fact Darwin left open the question of the creation of one or a few original forms of life ... 'life having been originally breathed into a few forms or into one', which he expanded further in the later editions of The Origin by saying, 'breathed by the Creator'. The argument of his critics was that if the first form had to be created, then the design involved in that creation included the whole subsequent development. This argument was expressed very clearly by a writer in the Quarterly Review. 'Design', he said, 'would be no more than a legitimate consequence of an admission which [Darwin] makes upon the threshold of his theory. He admits that the first life germ was a creation ... the universal result must be included in the act' (Q.R., 1869, p.175). And again, 'There is the original fact of collocation, and design cleaves to that fact ... if a systematic production is the result we must infer systematic forces in the cause'. (Q.R., 1869 pp. 159-160)

3 Charles Darwin, The Origin of Species (Sixth Edition, 1897), 103

J.S. Mill in his essay on theism drew attention to the eye as a superior example of the argument from design. The combination of different parts, he argued, makes sight possible; if things were arranged only slightly differently there would be no sight at all, or perhaps very impaired sight. The number of instances is considerably greater than is required by inductive logic to eliminate chance. Therefore, we are warranted by the canons of inductive logic in concluding that what brought all these elements together was some cause common to them all.

The natural sequel of the argument would be this:

Sight, being a fact not precedent but subsequent to the putting together of the organic structure of the eye, can only be connected with that structure in the character of a final, not an efficient cause; that is, it is not sight itself, but an antecedent Idea of it, that must be the efficient cause. But this at once makes the origin as proceeding from an intelligent will.

Mill acknowledges that the argument of "natural selection" is not without its force, but considers that "the adaptations of nature afford a large balance of probability in favour of creation by intelligence".¹

H.J. Jordan argued that Darwin's attempt to explain the emergence of the eye and other useful organs by the addition of accidental variations fails to take into account the differences between properties and parts of an organism. The mere addition of properties does not account for the complex relation and interaction of parts in an organism. The introduction of a new factor must relate not only to the existing harmony of the parts, but also create a wholly new harmony, and this excludes Darwin's notion of accidental variation. The failure, however, of Darwin's attempt to explain the complexity of the organism in terms of the sum of simple properties has served to sharpen the significance of the systematic and harmonious relations of the parts of living organisms.²

1 J.S. Mill, Essays on Religion, "Theism", 171, 172, 174

2 H.J. Jordan, Allgemeine Vergleichende Physiologie Der Tiere, (1929) Berlin

If the subject of design in organic nature is admissible at all then Paley showed a sure instinct in beginning with the strongest and best example. Here he believed the analogy between human contrivance and divine production is most clearly seen. The eye and the telescope are constructed on the same principle despite the fact that the one is a perceiving organ and the other an unperceiving instrument. If contrivance is proved in the case of the one, he argued, it is proved in the case of the other. Paley enlarged upon the adaptations observed in the eye, the way it copes with refraction, excessive light and different distances, and exclaimed,

Can anything be more decisive of contrivance than this is ? The most secret laws of optics must have been known to the author of a structure endowed with such a capacity for change.

Why, however, should there be contrivance of this kind at all suggesting the limitation of power ? Why, where there is omnipotence, cannot there be absence of contrivance ? Paley's answer to this is:

Whatever is done, God could have done without the intervention of instruments or means; but it is in the construction of instruments, in the choice and adaptation of means, that a creative intelligence is seen. It is this that constitutes the beauty of the universe. God, therefore, has been pleased to prescribe limits to his own power, and to work his ends within those limits. ¹

¹ William Paley Works (1838), 38 & 39

Design has a particular place in the plan and providence of God for his creature - man. Without it man is bereft of the knowledge of God through creation. It is the language by which God communicates to him his power and Godhead. There is, in Paley's view, a similar condescension of the Deity in general revelation as in special revelation, a stooping and accommodation to the needs of man. There is no necessity for design in creation. God freely chooses to employ contrivance where he need not have done so, in order to communicate with man and convey to him the notion of a creative Intelligence behind the world (cf. Romans 1 : 20).¹

Paley's doctrine of analogy is different from that of Aquinas and closer to the classical Protestant understanding of it:

Aquinas' justification of theological language rests on his interpretation of the God-creature relationship. According to his interpretation of this relationship, finite reality (creatures) points to God, since it is caused by God. Being caused by God, finite reality bears some similarity to Him because every effect resembles its cause. This interpretation of the God-creature relationship authorizes the use of human language, because finite reality itself points to God. ²

The terms of this argument presuppose a certain necessary correlation between the character of the finite creation and God who is its cause. But Paley regards the creation as endowed with particular characteristics, such as contrivance, not because they are essential to God, but because they are significant for man and have been freely adopted by the Deity with a view to communicating to him the existence of an intelligent Creator.

1 Cui Bono ? To what purpose such Engines, such pains, such expence ? (sic) The answer is easy, it is to answer the ends for which GOD bestowed so much art, wisdom and power about them; and an understanding and curiosity to search into them; it is to follow and trace him, when and whither he leads us, that we may see and admire his handywork ourselves, and set it forth to others that they may see, admire and praise it also. William Derham, Physico-Theology, p.466

2 H. Bouillard, The Knowledge of God (1969), 85

Calvin, speaking of the limits of a natural knowledge of God, asserts that this comes to us through the opus Dei, by which he means all the creative and providential activity of God. "We know God, who is invisible, only through his works"; God reveals Himself in nature, in the course of the natural processes and in the history of humanity.

Thus he has revealed Himself in the design of the universe, allowing Himself to be recognized every day, so that men cannot open their eyes without seeing the traces of His presence. 1

There is no part of the universe so small but it bears some marks of the power and wisdom of God. The world is the theatre of God's glory and man, the crown of creation, in his original purity and rectitude was capable of the knowledge of God.

But the knowledge that he could acquire of God from the contemplation of nature and of himself did not go beyond the analogy of extrinsic attribution. For in nature and man God reveals not His essentia, which no man can see, but His virtutes ... By these virtutes we know not what God is in Himself, but what he is like towards us (i.e., we obtain an analogy of extrinsic attribution; we say that God is wise, good, omnipotent because his works are wise, good, omnipotent). God gives us 'a description not of what He is in Himself, but of what He is towards us that our knowledge of Him may consist rather of a lively perception than in vain and aery speculation'. 2

This is similar to the point that Paley is making. Analogy is not traced in a straight line, as it were, from the essential nature of the Deity to the finite creation or vice versa, but is better represented by a broken line so that in natural theology, as, indeed, in revelation, we are not dealing with the essential attributes of God, but only with his power, wisdom and goodness as they relate to us. Paley puts the distinction in this way. We must

be careful to imitate the documents of our religion (i.e., the Scriptures and therefore revelation) by confining our explanations to what concerns ourselves and not ... affect more precision in our ideas than the subject allows of ... 3

1 Ibid., 107

2 Ibid., 108

3 William Paley, Works (1838), 164

And again, speaking of the omnipresence of God,

This is called a virtual presence. There is also what metaphysicians denominate an essential ubiquity; and which idea the language of Scripture seems to favour; but the former I think goes as far as natural theology carries us. 1

This qualification safeguards Paley's argument from a crude anthropomorphism which Hume makes the target of his ridicule in the Dialogues.

Paley, then begins his argument with the supreme example of design, or contrivance, as he is pleased to call it, in organic nature. He multiplies his examples endlessly from plants, animals and human physiology, although there is no need logically for him to do this, as he acknowledges. The purpose of producing so many examples is to make the weight of the argument felt cumulatively. Each example of design, however, stands in its own right and, if established, proves the argument. It does not depend upon a multitude of others.

Were there no example in the world of contrivance, except that of the eye, it would be alone sufficient to support the conclusion which we draw from it, as to the necessity of an intelligent Creator ...

If the other parts of nature were inaccessible to our inquiries, or even if the other parts of nature presented nothing to our examination but disorder and confusion, the validity of this example would remain the same. If there were but one watch in all the world it would not be less certain that it had a maker. 2

This, of course, is what Paley meant earlier by saying that a man cannot be driven from this argument by being told the extent of his ignorance. He knows enough for his purpose if he can produce one example of design.

1 William Paley, Works (1838), 166

2 Ibid., 49 & 50

It is worth noting here the contrast between Paley's position and that of Darwin. Darwin was always afraid that some irrefutable example of design might be produced and expressed his apprehension about it in such terms as "it would be absolutely fatal to my theory", it would be "subversive of my whole theory", and "it would annihilate my theory".¹ The reason for this uneasiness was that Darwin recognised the truth of Paley's contention. One example of design was sufficient both to overthrow the theory of evolution by natural selection and to establish the argument from design. Darwin's position was the antithesis of Paley's.

¹ Charles Darwin, The Origin of Species (Sixth edition), 149, 150, 152

III

We turn now to consider Paley's response to the suggestion that the appearance of design in the world may be explained by chance. David Hume states this argument in his Dialogues concerning Natural Religion thus:

For instance, what if I should revive the old Epicurean hypothesis ? This is commonly, and I believe justly, esteemed the most absurd system that has yet been proposed, yet I know not whether with a few alterations it might not be brought to bear a faint appearance of probability. Instead of supposing matter infinite, as the Epicureans did, let us suppose it finite. A finite number of particles is only susceptible of finite transpositions, and it must happen in an eternal duration, that every possible order or position must be tried an infinite number of times. This world, therefore, with all its events, even the most minute, has before been produced and destroyed, and will again be produced and destroyed, without any bounds and limitations. No one who has a conception of the powers of infinite, in comparison of finite, will ever scruple this determination. 1

In the end these perpetual revolutions will settle down to some kind of form, order and stability with the motion and active force maintained so as to keep it in equilibrium.

It is vain, therefore, to insist upon the uses of the parts in animals or vegetation, and their curious adjustment to each other. I would fain know how an animal would subsist unless its parts were so adjusted ? Do we not find that it immediately perishes whenever this adjustment ceases and, that its matter corrupting, tries some new form. 2

John Hick, in his discussion of this subject, sees the Darwinian theory of evolution by natural selection as spelling out this earlier speculative 'Epicurean hypothesis' of Hume:

Since Hume's day the hypothesis of self-regulating development of order has been strongly confirmed in the biological sphere. For some time before the publication of Charles Darwin's epoch-making 'Origin of Species' in 1859 a number of biologists had surmised that the various species inhabiting the globe were descended from one or only a few original kinds of simpler organism. But until Darwin showed the detailed stages of this development the theory of evolution seemed speculative. Darwin turned speculation into a concrete and convincing model of the history of life on our planet. He showed that the mechanism of evolution was a process of natural selection operating on the stream of descent by inheritance with variations provided by mutations. 3

1 D. Hume, Dialogues Concerning Natural Religion (ed. Nelson Pike; 1970), 69ff

2 Ibid., 72

3 John Hick, Arguments for the Existence of God (1970), 11

Perhaps the supposed affinity between Hume and Darwin is overstated by Hick. First, there is no concept of progressive development present in Hume's statement of the 'Epicurean hypothesis'. The idea is simply that of random rearrangement of the particles of the universe by successive changes and revolutions, until a point is reached when they fall into some kind of order which resembles the world we know and experience. It could, therefore, with equal cogency be argued that Hume's hypothesis anticipates and resembles more closely the pre-Darwinian catastrophists such as Cuvier and Buckland, who insisted that the geological record required a series of worlds each of which had been swept away by revolutions and succeeded by others. With this point of view, of course, Darwin found himself in complete disagreement. Hume's exhumation and restatement of the 'Epicurean hypothesis', therefore, has no real relationship with Darwinism in the sense that the latter can be traced from it, but is simply a speculative attempt to attribute all phenomena bearing the appearance of deliberate design to the working of chance.

Paley was familiar with such arguments, and considers two expressions of such a view.

One atheistic way of replying (to the argument from design) is to tell us that all which we see must necessarily have had some form, and that it might as well be its present form as some other.

He applies this to the eye, "that whatever was there must have had some form or other", and concludes that the opinion is "too absurd to be made more so by any argumentation".

Nor does it mend the answer to add, with respect to the singularity of the conformation, that after the event, it is no longer to be computed what chances were against it. This is always to be computed when the question is, whether a useful or imitative conformation be the product of chance or not. I desire no greater certainty in reasoning, than that by which chance is excluded from the present disposition of the natural world. Universal experience is against it. What does chance ever do for us? In the human body, for instance, chance, i.e., the operation of causes without design may produce a wen or wart, a mole or pimple, but never an eye ... In no assignable instance has such a thing existed without intention somewhere. 1

1 William Paley, Works (1838), 45

Paley's answer to this first statement of the argument from chance is an interesting one. In a recent attempt to reconstruct the design argument, the French physicist Pierre Lecomte du Noüy calculated that the probability of the simplest molecule forming by chance was quite impossible without the hypothesis of God.

The volume of substance necessary for such a probability to take place is beyond all imagination. It would be that of a sphere with a radius so great that light would take 10^{82} years to cover this distance.

Also the time required to form such a molecule from a material the size of our terrestrial globe would be 10^{242} billions of years (1 followed by 243 zeros);

But we must not forget that the earth has only existed for 2 billion years and that life appeared about one billion years ago, as soon as the earth had cooled ... We thus find ourselves in the case of the player who does not have at his disposal the time necessary to throw his dice often enough to have one single chance of obtaining his series ...¹

Wallace I. Matson in his book The Existence of God, has criticized du Noüy's argument by saying that the situation is not exactly as du Noüy has stated it:

The evolutionary concept is that just as man is the last stage reached to date in an immensely slow and complicated process of successive modification in less complex creatures, so also the protein molecule itself is the resultant of a very large number of successive stages of synthesis, beginning with quite simple compounds.

The probability therefore of protein coming into existence in nature is not, Matson argues, the probability (improbability) defined by du Noüy's calculation, but "the product of possibilities of conditions permitting the steps of the synthesis to be realized in succession."²

¹ Pierre Lecomte du Noüy, Human Destiny (1947), 34, 35

² W.I. Matson, The Existence of God (1965), 106, 107.

The distinction which Matson makes is in theory perfectly clear and legitimate. The calculation of the chances against a complex entity coming into existence de novo, and that of a similar body emerging from a process with many anterior stages leading up to it, are quite different from a statistical point of view. But what evidence is there to show that that in fact was the case, that this process took place 'in nature', as Matson asserts? The only possible evidence that could be adduced would be that from palaeontology, but here the record is silent. It stops far short of this point. So here we are moving not in the realm of fact, but of pure hypothesis. The theory of evolution, in order to circumvent the design argument, requires that all complex bodies in which there is the appearance of design be accounted for by development from simpler entities. We have already seen the weakness of this hypothesis and how the assumptions of the Victorian evolutionists about the emergence of more complex creatures from 'simple' single cells have been upset by more recent discoveries. This suggests that such a theory is hardly to be trusted here. Simply to say, whenever a complex entity is encountered, that it 'must' have developed from prior and more simple stages is merely to make arbitrary use of a favoured theory, but not to explain anything at all. So we find ourselves back with complex entities which seem to manifest design, and for the existence of which it is otherwise difficult to account.

Here then, as Paley rightly pointed out, the probabilities against such an entity being the product of chance must be taken into account.

It does not mend the answer (from chance) to add, with respect to the singularity of the conformation, that after the event, it is no longer to be computed what the chances were against it. This is always to be computed when the question is, whether a useful or imitative conformation be the product of chance or not. 1

1 William Paley, Works (1838), 45

"A useful conformation" for Paley was something like a watch in which the different parts worked together and served a particular end. Where such a thing existed the chances against its coming into existence by accident, as it were, were always to be computed and the probability against it was very great indeed. Though the knowledge was not available to Paley he would have recognised in this contemporary description for the layman of a 'simple' living cell " a useful conformation", and with his proclivity for mechanical analogies it would have appealed to him:

Each cell has been likened to a highly automated factory. This cell factory is controlled by a 'tape' with instructions called the DNA code - it is similar to a computer tape and it is fed into the cell's production machinery. On the shop floor of the cell there are more than 2,000 of these machines called 'Ribosomes'. They are attended by robots called enzymes and their mates (co-enzymes) and are divided into 200 specialist operations each with its own tool to start its machine. Professor Francis Crick says they must all have come into being together, otherwise even the first form of life would not work. 1

Here all the parts work together to serve a particular end; here we have "a useful conformation" and the probability against it being the product of chance is always to be computed. The question cannot be side-stepped by an arbitrary appeal to theory unsupported by fact.

The second form of the argument from chance which Paley dealt with is much closer to Hume's 'Epicurean hypothesis', and Paley himself expressed it in this way:

There is another answer (to the Design Argument) which has the same effect of resolving things into chance; which answer would persuade us to believe, that the eye, the animal to which it belongs, every other animal, every plant, indeed every organized body which we see, are only so many out of the possible varieties and combinations of being, which the lapse of infinite ages has brought into existence; that the present world is the relic of that variety, millions of other bodily forms and other species having perished, being by the defect of their constitution incapable of preservation, or of continuance by generation.

1 Victor Pearce, The Problem of Origin

Paley's reply to this is along two lines.

First he remarks that

There is no foundation whatever for this conjecture in anything which we observe in the works of nature; no such experiments are going on at present; no such energy operates as that which is here supposed, and which should be constantly pushing into existence new varieties and beings. 1

Paley adopted the same argument that Hume employed elsewhere for rejecting miracles, viz., universal experience is against it, no such experiments are going on at the present time. There is, however, this important difference, that Paley had merely to oppose this fact of experience to a hypothesis, i.e. that there have been changes, revolutions, and transpositions of the order and structure of physical life and phenomena in this world in a remote prehistoric past, from which no testimony is available, whereas Hume in opposing 'present experience' to miracles had to confront historical testimony which made his claim to have 'universal experience' on his side gratuitous. Professor Hooykaas, in commenting on the essential difference between history and palaeontological sciences, (i.e., those sciences that deal primarily with prehistory) affirms that they are under a distinct disadvantage in relation to historiography for there is no testimony of any kind. They can never wholly satisfy the criteria of truth accepted by the historian.² Paley's argument, therefore, is more destructive of Hume's hypothesis than is the same argument employed by Hume against the apologetic position adopted by Paley in his Evidences of Christianity.

1 William Paley, Works (1838), 46

2 R Hooykaas, The Principle of Uniformity, page xi



The extraordinary stability of species through time was a fact to which Cuvier, the leading anatomist of his day, drew attention shortly after Paley. In his Essay on the Theory of the Earth he declared that he had examined all the records of ancient Egypt and saw no dissimilarity between the animals there depicted and described and present day specimens.¹ Over the whole historical period there was no change of any significance to be noted in the species of animals that at present inhabit the earth. This objection was one which Darwin felt it was necessary to answer in The Origin. He did so by arguing that the law of natural selection was different from belief in an innate and necessary law of development. Animals may remain unchanged for long periods of time owing to the absence of chance variations, since there was no necessary or inner compulsion that these should arise. Therefore, the criticism that plants and animals had not changed during the historical period, or even if it were true that they had remained unchanged from the glacial period, could have no force against his argument.

The invoking of these vast periods of time during which there might be little or no evolutionary development at all, while it eased the burden of proof in one direction, proceeded to remove it altogether in another. Darwin himself had to recognise that the transmutation of species could not be directly proved. The geologist F.W. Hutton was one of the very few who saw this, and argued in his review of The Origin of Species that the book did not demonstrate the origin of species but the origin of varieties. In reply Darwin himself wrote:

I do not pretend to adduce direct evidence of one species changing into another, but I believe that this view in the main is correct, because so many phenomena can be thus grouped together and explained. 2

1 G. Cuvier, Essay on the Theory of the Earth (tr. Robert Kerr; 1813), 123

2 More Letters of Charles Darwin (ed. Francis Darwin and A.C. Seward), I (1903), 184

Darwin's evolutionary theory is not built upon experiment and immediate observation, but upon analogy. Paley's criticism, therefore, of Hume's argument ascribing the present order to a succession of changes and transpositions in the arrangement of matter in the past, is not without force when applied also to the theory of evolution through chance mutation and natural selection, since it draws attention to a basic weakness of that theory, viz., that universal experience is against it for no such experiments, i.e. changes of one species into another, are going on at present.

Secondly, Paley opposes to the 'chance hypothesis' the remarkable order of genera and species which he regards as not an order imposed simply by the human mind upon nature, but as residing in nature itself.

The division of organised substances into animals and vegetables, and the distribution and sub-distribution of each into genera and species, which distribution is not an arbitrary act of the mind, but founded in the order which prevails in external nature, appear to me to contradict the suppositions of the present world being the remains of an indefinite variety of existences, of a variety which rejects all plan ... How or why those which survive should be cast ... into regular classes the hypothesis does not explain, or rather the hypothesis is inconsistent with this phenomenon.

A significant point is raised here by Paley which even now presents a difficulty to the Darwinian theory of evolution. "On that theory" wrote Professor W.R. Thompson

evolution is essentially under control, being the result of natural undirected selection acting on small fortuitous variations. The argument specifically implies that nothing is exempt from this evolutionary process. Therefore, the last thing we should expect on Darwinian principles is the persistence of a few common fundamental structural plans. Yet this is what we find. The animal world, for example, can be divided into some ten groups of phyla ... all identifiable animals that have ever existed can be placed in these groups. Generally speaking, the subordinate groups are equally well defined ... These groups or divisions Darwin explained by the hypothesis that the intermediates are constantly eliminated by natural selection. I do not think we can be expected to accept this unproved supposition as an argument for Darwinism. But in any case it has no bearing on the persistence throughout geological time, in spite of fortuitous variations and natural selection, of the fundamental anatomical plans exhibited by the great groups ... Without introducing considerations quite foreign to his system we cannot explain why the anatomical type of the Echinoderm or the Insect continued to be inherited. 1

1 W.R. Thompson, Introduction to The Origin of Species (Everyman Edition, No. 811; 1956)

IV

Paley was interested in purposive order and design not only where it manifested itself in the useful arrangement of parts in a physical organism, but in other aspects of nature also. It is true, as we have already noticed, that he was specially drawn to mechanical analogies because they afforded "the most obvious proof" but there were also "other satisfactory evidences of design" in for example the chemistry of the body - the gastric juices, "the chemical wonder of animal nature". There were also the mysteries of instinct and beauty which are included in his system of natural theology:

An instinct is a propensity prior to experience and independent of instruction. We contend that it is by instinct that the sexes of animals seek each other, that animals cherish their offspring, that the young quadruped is directed to the teat of its dam, that birds build their nests. 1

Paley's main point here is that instinct, as it is witnessed in the behaviour of animals, appears to indicate forethought or prescience of particular situations and needs, which it would be quite impossible to attribute to the animal itself. This being so, how are we to account for it? Does not this point to the existence of an intelligent Creator every bit as much as does the evidence of design in a physical organism? Instincts may, of course, be changed and adapted very considerably according to the circumstances and conditions under which the animal lives, but, says Paley,

this makes nothing against the doctrine of instincts. The propensity being there it is probable enough that it may put the animal upon different actions, according to different exigencies. And this adaptation of resources may look like the effect of art and consideration rather than instinct: but still the propensity is instinctive. 2

For example, the woodpecker in Europe is supposed to lay her eggs in holes which she scoops out of decayed trees, but in the forests of Guinea in nests hanging from twigs of tall trees so that they are out of reach of snakes and monkeys. "Still the question returns, whence the propensity to build at all?"

1 William Paley, Works (1838), 119

2 Ibid., 122

The subject of instinct is one that greatly taxed Darwin. He devoted a whole chapter to it in The Origin of Species, and it is doubtful if he has explained the matter satisfactorily in terms of natural selection. What he appears to have done is to give some account, according to his theory, of the changes and adaptations that can arise in the natural instincts, but none at all of the origin of the instinct itself which was the fundamental question from Paley's point of view.

Instincts in Darwin's opinion are built up, like limbs and organs, by the slow accumulation of that which is useful, and the discarding of that which is not.¹ "No complex instinct can possibly be produced through natural selection, except by the slow and gradual accumulation of numerous slight yet profitable variations".² First a particular tendency is displayed, and then is developed by selection either natural or domestic. "Domestic instincts are sometimes spoken of as actions which have become initiated solely from long-continued and compulsory habit, but this is not so".³

Darwin's account of the instincts is not unlike that famous recipe for jugged hare which begins with the words, "First catch your hare". For natural selection, or domestic selection, to begin to work at all it must first have acquired its propensity, and this "we must in our ignorance", said Darwin, "call an accident".⁴ This, of course, is in keeping with the whole tenor of the doctrine of natural selection. It does not explain the phenomenon of life, or even the variations that natural selection is supposed to operate upon, but simply accepts them as facts. Where Darwin assigns the matter to accident, or, what is the same thing, chance, Paley continues to inquire, "Whence this propensity at all?" and to seek a rational explanation, i.e., one which is more in keeping with our experience of objects manifesting design, rather than resort arbitrarily to chance which is in essence a refusal to seek an explanation. It is perverse, he maintained, to ascribe to chance what may reasonably be explained by purpose.

¹ Charles Darwin, The Origin of Species (Sixth edition), 192

² Ibid., 193 ³ Ibid., 196 ⁴ Ibid., 197

Paley was also interested in the significance of beauty for the design argument:

A general property of animal forms is beauty. I do not mean relative beauty, or that of one individual above another of the same species; but I mean generally the provision that is made in the body of almost every animal, to adapt its appearance to the perception of the animals with which it converses. 1

We see this in the symmetry of the human body, i.e., the correspondence between the parts of the two sides of the body, but this is not repeated in the individual limbs; the hand, for example, may not be divided into two equal parts. 2 Or, again, the contents of the body are not equally distributed in the way that the outward appearance would suggest.

It is evident, therefore, that the external proportion does not arise from any equality in the shape or pressure of the internal contents. What is it indeed but a correction of inequalities; an adjustment, by mutual compensation of anomalous forms into regular congeries? The effect, in a word, of artful and, if we might be permitted so to speak, of studied collocation? 3

The symmetry and smoothness of the external appearance of the human body would appear to serve two purposes. One is the concealment of what would otherwise be repulsive to us.

Were it possible to view through the skin the mechanism of our bodies, the sight would frighten us out of our wits. 'Durst we make a single movement', asks a lively French writer, 'or stir a step from the place we were in, if we saw our blood circulating, the tendons pulling, the lungs blowing, the humours filtrating, and all the incomprehensible assemblage of fibres, tubes, pumps, valves, currents, pivots, which sustain an existence at once so frail and presumptuous?' 4

The other is to present us with an agreeable and pleasing appearance. All of which seems strongly suggestive of purpose and design. And, if it is allowed that such a purpose exists in any part of nature, then we may conclude that it exists in other parts, too, such as the tints of flowers, the plumage of birds, the furs of animals, the bright scales of fish and the painted wings of butterflies. 5

1 William Paley, Works (1838), 88

2 Ibid., 85

3 Ibid., 86

4 Ibid., 90

5 Ibid., 88

Paley acknowledges that some have dismissed the whole subject by saying that beauty is simply what we derive pleasure from, and that it is something that can be changed and adapted according to habit and fashion. He counters this, however, by arguing that the senses of taste and smell seem to indicate that there is a distinction of agreeable and disagreeable in the sense itself. While it is capable of being modified by habit and circumstance, it is not capable of being absolutely extended in its range or completely overthrown. There are always some tastes and smells that will remain disagreeable, however much we are subjected to them. ¹ This would suggest that there is what he calls "a determination" in the sense itself, "a native capacity of perceiving" certain qualities. The whole is not resolvable into mere habit or association. And, by analogy with the other senses, the same can be said of sight, "that there belongs to it an original constitution, fitted to receive pleasure from some impressions and pain from others." ²

Paley's appeal to man's innate awareness and sense of beauty and its rapport with the appearance of animal and vegetable bodies, to say nothing of inorganic nature, constituted an important part of his argument. Darwin sensed a threat from this quarter to his own theory and was anxious to ward it off.

With respect to the belief that organic beings have been created beautiful for the delight of man - a belief which it has been pronounced is subversive of my whole theory - I may first remark that the sense of beauty obviously depends upon the nature of the mind irrespective of any real beauty in the admired object, and the idea of what is beautiful is not innate or unalterable. ³

But Paley's point was that the capacity to appreciate beauty is both innate and alterable. These are not incompatible, or contradictory, as Darwin supposes them to be. Darwin appears to believe that because it can be shown that habit and fashion can influence man's appreciation of beauty, therefore, there is no 'innate sense', or 'native capacity', by which it is apprehended. But we have

¹ "their ripped-up carcasses (some mules which had died at the roadside at Ypres) were already adding vigorously to that stench of disintegration to which we never got used". Norman Gladden, Ypres 1917, 163

² William Paley, Works (1838), 89

³ Charles Darwin, The Origin of Species (Sixth edition), 150

just seen how Paley carefully argued this point, and while acknowledging the power of habit and custom, yet contended with reason that man is naturally endowed with a sense of beauty, and that his determination of this matter is not merely arbitrary. It is the congruity between this innate sense and the objects of nature which are presented to it, which becomes the ground for believing that there is design in the universe.

From the point of view of the theory of evolution by natural selection it is essential to insist that no organism produces that which is useless to itself in the struggle for existence and only of profit to another species such as man. Beauty, of course, if produced solely for the delight of man, but not for the advantage of the creature concerned would fall into this category. It was vital to Darwin's theory that he should be able to explain all such phenomena in terms of natural selection and the struggle for existence, even one instance to the contrary would be disastrous. "Natural selection", he wrote, "cannot possibly produce any modification in a species exclusively for the good of another species ... If this were so it would annihilate my theory." 1

He therefore felt obliged to

say a few words on the protest lately made by some naturalists against the utilitarian doctrine that every detail of structure has been produced for the good of its possessor. They believe that many structures have been created for the sake of beauty, to delight man or the Creator (but this latter point is beyond the scope of scientific discussion) or for the sake of mere variety ... Such doctrines if true would be absolutely fatal to my theory. I fully admit that many structures are now of no direct use to their possessors and many never have been of any use to their progenitors, but this does not prove they were formed solely for beauty or variety. No doubt the definite action of changed conditions and the various causes of modifications lately specified have all produced an effect, probably a great effect independently of any advantage thus gained. They have been produced by inheritance and at some point if we trace it back far enough we find it was of utility, direct or indirect, to its possessor. 2

1 Charles Darwin, op.cit., 152

2 Ibid., 149 & 150

This is not a clear answer to the objection that there are to be found in animals, plants and human beings, many examples of beauty which it is difficult, or even impossible, to explain satisfactorily in terms of natural selection. Darwin's reply seems to be that since any such instance would be fatal to his theory there must be an explanation in terms of utility. If that is not apparent now then it must have been the case once, and if we were able to trace it back far enough we should find this to be the case. He thus invokes a hypothesis to prove a hypothesis.

F.R. Tennant, in his discussion of the place of beauty in the design argument, also makes the point that there is a rapport between nature and the mind of man. The mind does not create beauty out of nothing. How we apportion aesthetic value between the human mind and external reality, he considers, is not important.

If we minimize phenomenal nature's gift by denying that her beauty is intrinsic ... we must allow to ontal nature an intrinsic constitution such that minds can make beauty as well as nomic order out of it. And the more we magnify man's part in this making, phenomenalsing and appreciating, the more motivation we have to believe that Nature comes to herself in man, has significance for man, that she exists not for herself, and without man is a broken circle. 1

1 F.R. Tennant, Philosophical Theology, II (1930), 90

Before considering the implications of the design argument for Paley's understanding of the personality of the Deity, we must notice the state of biological and botanical science in the eighteenth century which fashioned Paley's outlook and made inevitable a clash between his views and those of Darwin in the next century.

Linnaeus has generally come to be regarded as the founder of botanical and zoological studies; it is important, as C.E. Raven points out, for us to understand his precise place in the development of science. He was in no doubt himself as to what this place was. "For him classification, the arrangement and naming of species, is science and he is the great classifier." 1

Linnaeus' flair for classification led to the adoption universally both in botany and zoology of the system of

binary nomenclature whereby every species is known by a generic name, which it shares with its cognates and a specific, usually a descriptive adjective or (if a noun) its Latin name or the name of a classical personage - Linnaea borealis, Felis leo or Papilio machaon. 2

His skill in noting, and clearness in defining, differences, combined with his fertility in inventing names to describe and classify them led to a considerable growth in the definition of species. Because attention was being drawn to the differences rather than the similarities between animals and plants of the same genera scientists were becoming increasingly impressed by the enormous multiplicity of species.

1 C.E. Raven, Natural Religion, I, 152

2 Ibid.

When this system was placed within the context of belief in the constancy of nature, to which Linnaeus himself subscribed, the whole took on an extraordinary rigidity. In his day the simple definition of species was "that which proceeded at the creation from the hand of God".¹ Therefore, God had personally superintended all the minute distinctions and differences between species, none of which had changed since the beginning of creation. There was one doubt about this at the back of Linnaeus' mind, which he entered only as a suggestion in his diary, but found no place in his system, and that was that it may have been the case

that in the genera only one species had originally been created, and that this accidentally impregnated by others of different genera, gave rise to further cross-bred species. ²

It was, however, the doctrine of immutability of species, and of a world of organic nature absolutely and essentially unchanged since the creation, that prevailed generally in orthodox scientific circles in the eighteenth century, and this was the view that was shared by Paley himself. The conception of nature which he entertained was that in which all the different phyla of plants and animals which we now observe had descended in unbroken and unvaried succession from the time when they were first called into existence, and this extended even to the most insignificant details. For example, in considering the many thousands of different species of insects and their various methods of breathing, etc., he remarks:

The consideration of these appearances might induce us to believe that variety itself, distinct from every other reason, was a motive in the mind of the Creator, or with the agents of his will. ³

Or again, when he mentions the different methods of propagation and protection of plants, he concludes:

The result is that out of the many thousand different plants which cover the earth, not a single species perhaps has been lost since the creation. ⁴

1 C.E. Raven, Natural Religion, I, 152

2 Ibid., 155

3 William Paley, Works (1838), 132

4 Ibid., 136

Thus, the doctrine of the immutability of species when allied with a highly artificial system of classification, such as Linnaeus' - and Linnaeus himself acknowledged its artificiality ¹ - resulted in a concept of the natural order which was both arbitrary and inflexible, and was bound sooner or later to break up when it came into contact with reality and began to be examined by more observant naturalists in the nineteenth century. The link between classification of 'new species' and special creation was in the eighteenth century carried to an extreme pitch. Every new naming carried with it the implication that that particular species had been created in that precise form by the Deity at the beginning.

It was against this view that Darwin protested in The Origin. One or two examples will illustrate this. First, he refers us to the vegetable kingdom where there is a case analogous to that of the development of varieties in the domestic pigeon, viz.,

in the enlarged stems, or as commonly called, roots of the Swedish turnip, and Ruta бага ... and to these a third may be added, namely, the common turnip. According to the ordinary view of each species having been independently created, we should have to attribute this similarity in the enlarged stems of those three plants, not to the vera causa, of the community of descent, and a consequent tendency to vary in like manner, but to three separate yet closely related acts of creation. ²

The second example he refers to is that of the horse family, and the appearance of stripes in horses, asses, donkeys, etc. This is parallel to the case of variation in pigeons, says Darwin.

For myself, I venture confidently to look back thousands on thousands of generations, and see an animal striped like a zebra, but perhaps otherwise very differently constructed, the common parent of our domestic horse (whether or not it be descended from one or more wild stocks) of the ass, the hemionus and zebra. He that believes that each equine species was independently created, will I presume, assert that each species has been created with a tendency to vary, both under nature and under domestication, in this particular manner, so as often to become striped like other species of the genus; and that each has been created with a strong tendency, when crossed with species inhabiting distant quarters of the world, to produce hybrids resembling in their stripes not their parents, but other species of the genus. To admit this view is, as it seems to me, to reject a real for an unreal, or, at least, for an unknown, cause. It makes the works of God a mockery and deception ³

1 C.E. Raven, op.cit., I, 155

2 Charles Darwin, The Origin of Species (Sixth edition), 122

3 Ibid.

There was in Darwin a deistic tendency which led him to consider that it was unworthy of the deity to conceive of him as being involved in innumerable special acts of creation, which the existence of thousands of separate species would require, according to the eighteenth-century doctrine. The world of organic nature must be as much under the rule of law as the universe as a whole. He could

no more admit that planets move in their courses, and that a stone falls to the ground not through the intervention of the secondary and appointed law of gravity, but from the direct volition of the Creator

than the "special creation of different species of rhinoceros ..." According to him,

It accords with what we know of the laws impressed by the Creator on matter that the production and extinction of forms should, like the birth and death of individuals, be the result of secondary means. It is derogatory that the Creator of countless universes should have made by individual acts of His will the myriads of creeping parasites and worms. 1

There was, then, a metaphysical element present in Darwin's thinking which made the extreme eighteenth-century statement of the doctrine of special creation and the immutability of species unacceptable to him. But also in the light of his study of variation under domestication he was questioning the structure of the classification and definition of species as it had been commonly accepted by science generally until that time, and by Paley in particular. In his chapter on "Variation under Nature" in The Origin he draws attention to the problem attending definition of species and its underlying link with special creation in the minds of scientists generally.

"No one (definition)", he writes,

has satisfied all naturalists; yet every naturalist knows vaguely what he means when he speaks of a species. Generally the term includes the unknown element of a distinct act of creation. 2

1 The Foundations of the Origin of Species (ed. F. Darwin; 1909), 253 & 254

2 Charles Darwin, The Origin of Species (Sixth edition), 30

What we see in nature, Darwin insists, are many individual differences and varieties, sometimes merging by fine intermediate gradations. Where the intermediate gradation between species is not found, it must be assumed to exist somewhere, or to have existed in the past. The inadequacy of the old system to deal with these facts is seen in the eccentricity of the theories adopted to keep it intact.

Some few naturalists maintain that animals never present varieties; but then these same naturalists rank the slightest differences as of specific value; and when the same identical form is met with in two distinct countries, or in two geological formations, they believe that distinct species are hidden under the same dress. The term species thus comes to be a mere useless abstraction, implying and assuming a separate act of creation. ¹

What Darwin was faced with here was as much a logical as a biological problem,² created by the confused state in which eighteenth-century science had left the subject of the definition and denotation of the term species. Wittgenstein once said, "What is or is not a cow is for the public to decide." By which he meant that the denotation of the term is determined by popular or customary usage rather than arbitrary definition. In the period of eighteenth-century classification it was not the public which was consulted, but the minute and often highly artificial judgement of the philosophical mind, backed by the understanding that the slightest difference presupposed a totally distinct and separate act of creation. The smallest differences were regarded as specific; and even if the forms were identical, encountered in different parts of the world they were considered to be distinct species.

¹ Charles Darwin, The Origin of Species (Sixth edition), 36

² In a letter to Asa Gray, November 29th (1859), Darwin wrote:
You speak of species not having a material base to rest on, but is this any greater hardship than deciding what deserved to be called a variety ... What a jump it is from a well-marked variety, produced by a natural cause, to a species produced by a separate act of the hand of God! But I am running on foolishly. By the way, I met the other day Phillips the palaeontologist, and he asked me, 'How do you define a species?' I answered, 'I cannot'. Whereupon he said, 'At last I have found out the only true description, - any form which has ever had a specific name!'

More Letters of Charles Darwin (ed. Francis Darwin and A.C. Seward; 1903), I, 127

The first thing Darwin sought to do was to break down these artificial and arbitrary distinctions. "Certainly no clear line of demarcation has yet been drawn between species and sub-species," he wrote in The Origin,

that is the forms which in the opinion of some naturalists come very near to, but do not quite arrive at, the rank of species, or again between sub-species and well marked varieties, or between lesser varieties and individual differences. Those differences blend into each other by an insensible series; and a series impresses the mind with the idea of an actual passage 1

Darwin looked upon individual differences as being steps towards slight varieties and slight varieties as being steps towards more strongly marked varieties.

The well marked varieties may well be incipient species and so on. "From these remarks", he wrote,

it will be seen that I look at the term species as arbitrarily given for the sake of convenience to a set of individuals closely resembling each other, and that it does not essentially differ from the term variety, which is given to the less distinct and more fluctuating forms. The term variety again in comparison with mere individual differences, is also applied arbitrarily for convenience's sake. 2

There was, therefore, nothing sacrosanct in Darwin's view of the term species. It differed not at all logically from the term variety. But formerly the term had been surrounded by a mystique which gave the naturalist the impression that when he named a species he was actually isolating and denoting a piece of the essential furniture of creation. Linnaeus looked upon his task as similar to that of Adam's naming the animals in Paradise and found a sacred calling in this conception of his work. His students, in bad taste, but with a similar understanding, printed under his portrait the motto Deus creavit, Linnaeus disposuit.

The effect of Darwin's argument was (a) to deny the term species to what were really varieties, but which had been exalted to the rank of species on the grounds of slight differences, and (b) to sever the term from its mystical associations which linked it with a special act of creation.

1 Charles Darwin, The Origin of Species (Sixth edition), 38

2 Ibid., 39

All this was bound to have an adverse effect on Paley's argument since he had entered into the minutiae of design in organic creation showing, for example, how the beaks of different species of birds were perfectly adapted to their needs, and maintaining that they had been specially created thus for the purpose. If, however, they had become such through variation and natural selection the ground for such reasoning was removed. We must remember, nevertheless, exactly what Paley had claimed for his argument. He might have been disconcerted to learn that many of the intricate and beautiful adaptations of animals might be attributed to secondary causes, but he would not necessarily have felt defeated, for the many examples he gives are but illustrations of his argument. They are not every one essential to it. The force of them he regarded as cumulative. It was sufficient for his purpose if only one such example of design could be found. If, for instance, we will allow Paley the eye, which caused Darwin such uneasiness, he will readily concede all the rest. It would be sufficient for his purpose.

We must likewise remember the limitations of Darwin's argument. It has been said that what he proved was not the origin of species but the origin of varieties. He began with the many different species of domestic pigeon and showed, with some conjecture, how they must all have descended from the rock pigeon. What Darwin observed going on under domestic cultivation and selection was the development of varieties of pigeons, which, as he said, if shown to a naturalist as wild birds he would class as different species. Since, he contended, these 'species' were not the productions of special acts of creation he wished to extend this argument by analogy to the many different species of finches, and other groups of birds in nature, and arrive at a similar conclusion. Natural selection brought about in nature the same, or similar, results to those which we see being produced by domestic selection. If it is granted that the argument is sound, and supported by sufficient evidence, what does it prove ?

It proves that different varieties of certain classes of animals, which have been arbitrarily called species, have been produced by variation and natural selection, and not by special creation, but it does not prove that all the different classes of animals themselves have been produced in this way. That, of course, was the conclusion to which Darwin wished to come, but it remained a leap that he had to make without the support of clear or conclusive evidence. 1

It is popularly assumed that the chief evidence for Darwin's theory derived from palaeontology, but Darwin was himself quite open about the embarrassment that the poverty of the geological record in this respect caused him.

I do not pretend that I should ever have suspected how poor was the record in the best preserved geological sections, had not the absence of innumerable transitional links between the species, which lived at the commencement and close of each formation, pressed so hardly on my theory ... The abrupt manner in which whole groups of species suddenly appear in certain formations has been urged by several palaeontologists - for instance by Agassiz, Pictet and Sedgwick - as a fatal objection to the belief in the transmutation of species. If numerous species, belonging to the same genera or families, have really started into life at once, the fact would be fatal to the theory of evolution through natural selection. For the development by this means of a group of forms ... must have been an extremely slow process 2

Darwin looked to the future to vindicate him in this, and to fill up the many gaps by fresh discoveries of the intermediate links - but this has not happened.

Because of this difficulty it appears sometimes as if Darwin is in two minds about the extent of what he should claim for his theory, and in The Origin he certainly leaves open the possibility that the present variety of animals and plants may have descended from a few forms or one.

1 "... the attempt to explain all living forms in terms of evolution from a unique source ... is one that is premature and not satisfactorily supported by present-day evidence. ... we can, if we like, believe that such an evolutionary system has taken place, but I for one do not think that 'it has been proved beyond all doubt'. ... I shall present evidence for the point of view that there are many discrete groups of animals and that we do not know how they have evolved nor how they are interrelated." G.A. Kerkut, Implications of Evolution (1960), vii-viii.

"That owing to the existence of different genotypes within a species and the somewhat different adaptive characters of these genotypes, samples of a widespread population taken at different points may be recognisably different in various ways, or a population of this kind spreading from a centre (as in the case of an introduced insect) may develop local varieties sufficiently marked to be regarded as species by a taxonomist, may be freely acknowledged ... But it is a far cry from these facts to the speculations of the Origin and the Victorian concept of evolution." W.R. Thompson, Introduction to The Origin of Species (Everyman Edition, No. 811; 1956)

2 Charles Darwin, The Origin of Species (Sixth edition), 264 & 265

The state of the argument, therefore, in relation to Paley stands thus.

Paley, following the scientific beliefs of his day, regarded all species as classified by botanists and biologists as immutable, however small or insignificant the differences upon which this classification was based might be. He regarded them all as the result of special creation and purposively endowed by the Creator with all the special aptitudes and adaptations that they displayed.

Darwin, on the other hand, observed something which challenged this position. He saw that, by domestic selection, variations in plants and animals may be produced which amounted to what the naturalists in the eighteenth century and early nineteenth century would have regarded as specific differences if they had encountered them in nature. This led him to conclude that the term species was arbitrary and that it had no necessary connexion with the concept of special creation. He believed he could discern a similar principle to that of domestic selection at work in nature which would account for many of the species recognised by naturalists and regarded as being the result of immediate acts of creation by the Deity. What Darwin exposes here is the arbitrary use of the term species in the eighteenth century and the artificiality of the system of classification, to which we have referred; and that the term so used, and the system constructed upon it, did not necessarily reflect a true picture of creation as it was at the beginning. Yet to show that there may be variation within certain groups or families of plants and animals is not the same as demonstrating that all organisms are so connected and owe their origin to this process. Darwin was conscious of the enormous gaps in the wider application of his theory, which could not be filled either by palaeontology, or by the small variations directly observed. This led him to adopt an ambivalent position in The Origin, where he leaves open the possibility that the multitude of species we now see may have descended, not from one, but several different forms. Paley's argument was exposed to criticism because of its identification with the extremes of eighteenth century thought on the subject of species and special creations. Yet this affects only the periphery of the argument and not that which is essential to it. If a few forms or only one exhibit purposive design and adaptation that would in Paley's estimation be sufficient.

VI

We now turn to consider the theological implications of the design argument as Paley understood them. "Contrivance if established", he wrote,

appears to me to prove everything which we wish to prove. Amongst other things, it proves the personality of the Deity, as distinguished from what is sometimes called nature, sometimes called a principle; which terms in the mouths of those who use them philosophically, seem intended to admit and to express an efficacy, but to exclude and to deny a personal agent. Now that which can contrive, which can design must be a person. These capacities constitute personality, for they imply consciousness and thought. They require that which can perceive an end or purpose; as well as the power of providing means, and directing means, and of directing them to their end. 1

If contrivance or design in nature be granted then the inference which Paley draws must follow. The strength of the argument on this ground has always been acknowledged by the most profound thinkers. Kant described it as

the oldest, the clearest and the most in conformity with the common reason of humanity. For these reasons it would be utterly hopeless to attempt to rob this argument of the authority it has always enjoyed. The mind, increasingly elevated by these considerations, which although empirical, are remarkably and continually adding to their force, will not suffer itself to be depressed by the doubts suggested by subtle speculation; it tears itself out of this state of uncertainty, the moment it casts a look upon the wondrous forms of nature and the majesty of the universe. 2

It is significant that Hume, while attacking the argument from design in his Dialogues concerning Natural Religion, yet acknowledges the strength of it.

It is generally agreed that the theories propounded by Philo are those of Hume himself. At the commencement of the dialogues all three participants agree that the existence of God must be taken for granted. No reasonable man would deny this. He is the cause of the universe whatever that might be. The subject of the Dialogues resolves itself more into a question of the character of the Deity rather than of his existence. The design argument is regarded by Philo as pointing fairly conclusively to a Creator, but as leaving his nature and attributes in deep obscurity and confusion. This is brought out very clearly in a discussion between Philo and Cleanthes on the problem of evil and human misery. How can we ascribe to the Deity, argues Philo, both perfect benevolence and omnipotence when there is so much evil and misery in the world ?

1 William Paley, Works (1838) 2. I. Kant, Critique of Pure Reason

154 & 155

(tr. J.M.D. Meiklejohn, 1934). 363

Here, Cleanthes, I find myself at ease in my argument. Here I triumph. Formerly, when we argued concerning the natural attributes of intelligence and design I needed all my sceptical and metaphysical subtlety to elude your grasp. In many views of the universe and its parts, particularly the latter, the beauty and fitness of final causes strikes us with such irresistible force that all objections appear (what I believe they really are) mere cavils and sophisms; nor can we then ever imagine how it was ever possible for us to repose any weight upon them. But there is no view of human life or of the condition of mankind from which, without the greatest violence, we can infer the moral attributes or learn that infinite benevolence, conjoined with infinite power and wisdom, which we must discover by the eyes of faith alone. It is your turn now to try the labouring oar, and to support your philosophical subtleties against the dictates of plain reason and experience. 1

There is no reason to believe that this is other than a candid confession of how Hume saw the strengths and weaknesses of the design argument. It was strong on its inference from design in nature and the world to an architect or designer of these things, but weak when it came to establishing the nature and attributes of that being in conformity with the orthodox Christian understanding of them. Here indeed Hume felt it was so seriously inadequate that it undermined and destroyed the value of the former inference.

At the conclusion of the dialogues Philo reiterates this position. Philo's summing up, in which he affirms that "the cause, or causes, of the order in the universe probably bear some remote analogy to human intelligence ..." to which "the most inquisitive, contemplative and religious man" must give a "plain, philosophical consent" believing that "the arguments on which it is established exceed the objections which be against it ..." ², is regarded by some as a strange reversal of his earlier position, a sudden and uncharacteristic change of direction at the end of the dialogues. But, as we have noticed, it is not out of keeping with assertions which he has made earlier and while, on the whole, Philo argues that obscurity must attend the argument from design regarding the character of God, he is prepared to acknowledge its force when it is argued that that which manifests order and design must have mind and intelligence as its originating cause.

1 D. Hume, Dialogues Concerning Natural Religion (ed. Nelson Pike; 1970), 92

2 D. Hume, Dialogues Concerning Natural Religion (ed. Nelson Pike; 1970), 122

What, then, are we to make of the character of the Deity ? Is the subject of his attributes shrouded in such darkness and obscurity as the argument of Philo in The Dialogues suggests ? Even here Paley is reasonably confident that natural theology need not be at a loss; that the argument from design can furnish us with some understanding of the nature and character of God which is not inconsistent with that which has been given by revelation. Revelation itself, while it speaks of the omniscience, omnipotence and the eternity of God, is an accommodation to our limited apprehension of the meaning of these terms, and represents God to us not as he is in himself, but as he stands in relation to us. It is his virtual rather than his essential presence, power and wisdom that are communicated to us and with which we become acquainted. If, therefore, Paley argues,

we imitate the documents of our religion, by confining our explanations to what concerns ourselves, and do not affect more precision in our ideas than the subject allows of, the several terms which are applied to denote the attributes of the Deity may be made, even in natural religion, to bear a sense consistent with truth and reason, and not surpassing our comprehension. 1

First, Paley deals with the question of whether the term "infinite" may properly be applied to the natural attributes of God when these attributes are regarded as the inferences, or conclusions, of natural theology. Hume, for example, had stated in the Dialogues that if we argue from the world to God "the cause ought only to be proportional to the effect, and the effect so far as it falls under our cognisance is not infinite ..." What grounds have we, then, to ascribe that attribute to the Divine Being ? 2

1 William Paley, Works (1838), 164

2 Hume, op.cit., 50

Paley's answer to this is, that, of course, it is quite true that a natural theology cannot of itself arrive at the strictly infinite character of God's attributes and nature:

'Omnipotence', 'omniscience', 'infinite' power, 'infinite' knowledge are superlatives; expressing our conception of these attributes in the strongest and most elevated terms which language supplies. We ascribe power to the Deity under the name of 'omnipotence', the strict and correct conclusion being, that a power which could create such a world as this is, must be, beyond all comparison, greater than any which we experience in ourselves, than any which we observe in other visible agents; greater also than any which we can want for our individual protection and preservation, in the being upon whom we depend. It is a power, likewise, to which we are not authorized, by our observation or knowledge to assign any limits of space or duration. 1

Some have felt that by conceding the legitimacy of this philosophical criticism of natural theology Paley has involved himself in a serious conflict with orthodoxy since a finite God, however great, even superlatively and unimaginably great, does not measure up to the standard of Scripture and credal definition. Paley, however, is not suggesting that the notion of God which we derive from natural theology is adequate in all respects. His view of natural theology is that it is the handmaid of revelation. He was not, like the Deists, seeking to establish a system of natural or rational theology which would dispense with the need for revelation. On the contrary he regarded the conclusions of natural theology as a step in the direction of revelation:

It is a step to have proved, that there must be something in the world more than what we see. It is a farther step to know, that amongst the invisible things of nature, there must be an intelligent mind, concerned in its production, order and support. These points being assured to us by Natural Theology, we may well leave to Revelation the disclosure of the many particulars, which our researches cannot reach, respecting either the nature of this Being as the original cause of all things, or his character and designs as a moral governor. 2

The aim of Paley's Natural Theology was

to provide a limited confirmation of the Christian religion, which was in no way to be confined to the bare conclusions he supposed himself able to demonstrate. The concept of God which could emerge from the application of Paley's empirical methods would inevitably be a dessicated one; but Paley was of the apparently sincere opinion that a proof for the existence of even this poor an approximation of the holy God of Christianity was a step toward a strengthened confidence in invisible reality, consequently in the possibility of divine revelation, hence in the truthfulness of the Bible and ultimately in the full Christian God. 3

1 William Paley, Works (1838), 164 - 5

2 Ibid., 193

3 Frederick Ferré, Introduction to Paley's Natural Theology (1963), xxvii

However, while Paley acknowledges that the conception of God attained in natural theology falls short of that of orthodox statements of his character, account must also be taken of the different logical function of such language when it is used in ordinary religious discourse and worship, and when, on the other hand, it is employed for the purpose of theological definition. What Paley is suggesting here is, that religious discourse is essentially practical in this matter of infinite attributes. The degree of power and knowledge necessary to bring the universe into existence cannot, from our point of view, be distinguished from infinite. It would, therefore, appear perfectly proper and legitimate for the language of piety to speak of the "infinite" power and wisdom of God. If it is recognised that this represents a different realm of discourse from that of strict philosophical definition, misunderstanding cannot arise. For example, Ludwig Wittgenstein in the Philosophical Investigations considers the different uses of the word "exact" and its "family resemblance" in different language games. In the laboratory "exact" in terms of measurement of time may mean hundredths of a second. But if I say to somebody in a quite different, social context, "Meet me at 8.30 p.m. exactly", I do not decide whether he is late or early by such standards, and in this "language game", as he would describe it, I may quite properly use the word "exact", but it does not necessarily carry with it the precision of meaning that attached to it in a different logical usage. To say, however, as some have tried to do that it must always carry with it one precise meaning, viz., that of the laboratory, and that unless it is employed in this sense it cannot be used, is to do violence to language and force an arbitrary definition upon it.

Paley would appear, then, to be making a perfectly valid point when he draws our attention to the practical nature of religious language in this respect. While "infinite" may quite properly have an exactly defined meaning in the context of philosophical or theological discussion, this does not preclude the language of piety and worship employing it in a less precise way. The power and wisdom that are adequate to the production and superintendence of the universe far surpass every idea we have of wisdom and power derived from the most intelligent and powerful being with whom we are acquainted, and may, therefore, legitimately be described as "infinite".

If then it can be established, as Paley believed it could, that there is evidence of purposive design in the world, even though the examples of this may be few, or just one single instance, then the inference may be drawn from this to the existence of God. "Design must have a designer. That designer must be a person. That person is God."¹ We have taken some account of the arguments that have been employed against Paley, but we have also noted how difficult it is to banish completely from the world the notion of design. Just when it is imagined that a limit has been reached at which teleological design is excluded it is found to recur. Design, as Paley says, if it exists, must have a designer. "Whatever includes marks of contrivance, whatever in its constitution testifies design, necessarily carries us to something beyond itself, to some other being, to a designer prior to and out of itself." In this way Paley moves from the existence of the thing which is designed to the existence of the Creator who designed it. The universe cannot be God: "Nothing can be God which is ordered by a wisdom and a will, which itself is void of, which is indebted for any of its properties to contrivance ab extra."² The universe, therefore, points us beyond itself to the existence of its Creator.

Regarding the natural attributes of God, Paley acknowledges the force of Hume's philosophical criticism that the cause cannot be proved to exceed the effect, and in view of this the term "infinite" may not strictly be applied in natural theology. However, since natural theology does not stand on its own in the system of religion which Paley conceived, but simply affords a limited confirmation of the precise and true nature of God's character given by revelation, the employment of the term "infinite" in natural theology Paley regarded as warranted by the practical nature of religious discourse, and because for all ordinary purposes, the power and wisdom necessary in any being responsible for the universe could not, from our point of view, be distinguished from infinite.

¹ William Paley, Works (1838), 164

² Ibid., 156

We must now consider Paley's argument regarding the moral attributes of God. Here Hume's objections are specially relevant.

On this point, as we have already noticed, the sceptical Philo, whom we take to represent Hume's own views, is made to triumph over his opponent Cleanthes.

There is no view of human life, or the condition of mankind, from which, without the greatest violence, we can infer the moral attributes [of the Deity], or learn that infinite benevolence, conjoined with infinite power and infinite wisdom, which we must discover by the eye of faith. 1

The ground of this conclusion is found earlier in the argument in a passage of reasoning which Hume regards as "short, clear and decisive". Cleanthes had argued that on balance "health is more common than sickness, pleasure than pain, happiness than misery". 2 This, argues Philo, is contrary to all human experience and will not stand. But allowing it to be so,

why is there any misery at all in the world? Not by chance, surely. From some cause then. Is it the intention of the Deity? But he is almighty. Nothing can shake the solidity of this reasoning. 3

Here Hume believes he has a conclusive argument against a natural theology establishing belief in all all-powerful and completely benevolent being who is responsible for the universe. If this were the case things would be ordered differently, for the conjunction of absolute power and absolute benevolence in one person would ensure that there would be no suffering. Animals could, for example, be made incapable of experiencing pain and their safety and welfare preserved and cared for in some other way, perhaps by special interventions of the Deity when they were in danger. Also, instead of the extremes of heat and cold and tempest, which we now observe, the universe could have been framed so as to preserve a medium in all these things. In this way, argues Philo, much of the misery and suffering of the sentient creation might be avoided.

1 D. Hume, The Dialogues Concerning Natural Religion (ed. Nelson Pike; 1970), 92

2 Ibid., 90

3 Ibid., 91

Even if we allow that our knowledge of the universe and its mechanism is too small and partial to enable us to pronounce upon it in this way, yet it must still be acknowledged that we cannot argue from the mixed phenomena of the universe to an unmixed principle of goodness or benevolence behind it all. Hume is prepared to allow that if the goodness of God could be established on any other grounds than empirical, then "these phenomena however untoward, would not be sufficient to subvert that principle, but might easily, in some unknown manner, be reconcilable to it." ¹ But in the design argument this is not the case. The grounds for belief in the goodness of the Creator are not a priori, but empirical.

This goodness is not antecedently established but must be inferred from the phenomena ... (and) ... there can be no grounds for such an inference while there are so many ills in the universe, and while these ills might so easily have been remedied, as far as human understanding can be allowed to judge on such a subject. ²

While bad appearances may be compatible with absolute goodness their existence makes it impossible to prove it.

There are in effect four hypotheses that can be formulated concerning the first causes of the universe and Hume expresses them thus :

that they are endowed with perfect goodness; that they have perfect malice; that they are opposite and have both goodness and malice; that they have neither goodness or malice.

He then comes to the following conclusion:

Mixed phenomena can never prove the two former unmixed principles; and the uniformity and steadiness of general laws seem to oppose the third. The fourth, therefore, seems by far the most probable. ³

¹ D. Hume, The Dialogues Concerning Natural Religion (ed. Nelson Pike; 1970), 102

² Ibid., 103

³ Ibid., 104

Such difficulties in the way of establishing in natural religion the goodness of God were familiar to Paley, and he attempted to give an answer to them in the concluding chapters of his work. He dwells first upon the joyfulness of existence. "It is after all a happy world. The air, the earth, the water teem with delighted existence." ¹ He remarks even upon the pleasures of old age, and it is worth remembering that while he was writing these lines he was himself suffering considerable pain from the disease that was shortly to end his life. It will be objected, he concedes, that these are chosen and favoured instances:

We answer that they are instances, nevertheless, which comprise large provinces of sensitive existence, that every case we have described is the case of millions. ²

Paley is of the opinion that a broad and impartial survey of the conditions of human and animal existence generally would result in "a preponderancy in favour of happiness by a vast excess". Happiness is the rule, misery the exception. ³

This conclusion is of course difficult to refute, as it is difficult to establish. It certainly stands in marked contrast to David Hume's picture of nature as blind and indifferent to the fate of her children.

The whole presents nothing but the idea of a blind nature, impregnated by a great vivifying principle, and pouring forth from her lap without discernment or parental care her maimed and abortive children. ⁴

The conclusion arrived at does depend to some degree upon the nature of the person observing life and the world in general. A person of an optimistic frame of mind will tend, on the whole, to gain a more favourable impression of existence than the pessimist who dwells upon the darker side of life. There is simply no means of measuring pain or pleasure in the whole of the sentient creation, and proving conclusively a preponderance of the one or the other.

¹ William Paley, Works (1838), 168

² William Paley, Works (1838), 170

³ Ibid.

⁴ D. Hume, The Dialogues Concerning Natural Religion (ed. Nelson Pike; 1970), 103

Yet there does seem to be much in Paley's general survey to commend his conclusion. It is fair to say, as he does, that sickness and calamities are the exception rather than the rule, that pain has a subordinate and unintentional role (teeth are designed for eating not aching), and that too much is often made of the sufferings of the animal kingdom. This latter, as Paley remarks, arises from ascribing to animals the fears and apprehensions that we ourselves experience, but which they do not possess. It was the tendency later of evolutionists like T.H. Huxley to present the theory of natural selection with the whole emphasis upon the struggle for existence - "Nature red in tooth and claw", the charnel-house of nature. But this, according to C.E. Raven, was unnecessary and unjustified. T.H. Huxley in particular, Raven says, took little interest in the living species. Had he done so he would have found things to be quite different.

A true appreciation of animal life would lay little stress on pain and terror and much upon sensitiveness to environment, spontaneity of reaction, social adjustments to mates and offspring and at the higher levels of life, on the emergence of the rudimentary appreciation of value. ¹

There was undoubtedly a vein of pessimism in Huxley's thought which found final expression in the Romanes Lectures. Whether that pessimism was engendered by the theory of evolution, or whether the theory itself attracted men of that nature we cannot discuss here, but it does suggest that Paley's view of nature is quite as permissible as that of the pessimist. Indeed, there is much that can be said in its favour, and, allowing for the Victorian preoccupation with "nature red in tooth and claw" - a mood and outlook that has carried over to the twentieth century and still affects us today - it may reasonably be argued that on the whole there is greater happiness than misery in the world.

However, while Paley contends that happiness is the rule and misery the exception, he recognises that account has to be taken of the misery in the world when we are seeking to establish the benevolence of God. It is this mixed state of things which is the problem for natural theology. Hume had argued that mixed phenomena can never establish an unmixed principle,

¹ C.E. Raven, *Natural Religion and Christian Theology*, I, 181

that the mixture of happiness and suffering in the world indicated the moral indifference of the Creator to his creation, i.e., that he was without goodness or malice. Paley proposes similar considerations about the Deity to those of Hume, but comes to a different conclusion.

When God created the human species either he wished their happiness or he wished their misery; or he was indifferent and unconcerned about either.

If he had wished our misery, he might have made sure of his purpose, by forming our senses to be so many sores and pains to us, as they are now instruments of gratification and enjoyment, or by placing us amidst objects so ill suited to our perceptions, as to have continually offended us, instead of ministering to our refreshment and delight. He might have made for example everything we tasted bitter; everything we saw loathsome; everything we touched a sting; every smell a stench; every sound a discord.

If he had been indifferent about our happiness or misery, we must impute to our good fortune (as all design by this supposition is excluded) both the capacity of our senses to receive pleasure, and the supply of external objects fitted to produce it.

But either of these, and still more both of them, being too much to attribute to accident, nothing remains but the first supposition, that God, when he created the human species, wished their happiness, and made for them the provision which he has made, with that view and for that purpose. 1

The assumption of moral indifference on the part of the Creator leaves too much out of account. It makes the congruity between the senses and the objects which affect them, as well as the existence of pleasure itself, a mere accident.

It seemed to Paley that the animal creation and ourselves experienced far more pleasure than was necessary simply for the maintenance of life. He regarded this as something "superadded" expressly for the purpose of giving happiness and therefore pointing to the benevolence of the Creator; e.g., why should not the pain of hunger be sufficient for preservation? Why should eating be pleasurable? 2 "Why should the juice of a peach, applied to the palate, affect the part so differently from what it does when rubbed upon the palm of the hand?" 3

1 William Paley, works (1838), 171

2 Ibid., 176

3 Ibid.,

These reflections also raised for Paley the equally significant subject of the congruity that exists between the senses and the objects that stimulate them pleurably. This applies not merely to the sense of taste, but hearing and seeing and smelling. "The necessary purposes of hearing might be answered without harmony; of smell, without fragrance; of vision, without beauty ." 1 The coincidence that is required here between the object and the sense he believes to be something which no accident can account for. Even though the sense, as we noticed before in the case of appreciation of beauty, is capable of variation through habituation to certain stimuli yet the original capacity is not itself explained in this way. "It cannot be shown", as Paley put it, "to result from any fixed necessity in nature, that what is frequently applied to the senses should of course become agreeable to them." 2 Indeed there are many things which it is obvious could never become agreeable merely by being repeatedly presented to the senses.

So, then, both the gift of pleasure beyond biological requirement, and the remarkable congruity and coincidence of the senses and the objects which stimulate them, are opposed to the conclusion that the Deity is indifferent to his Creation. The only satisfactory explanation that can be given of them is the will of the Creator.

It may reasonably be asked, why is anything a pleasure ? and I know no answer which can be returned to the question, but that which refers it to appointment. 3

Thus Paley establishes the goodness of God for his system of natural theology. It is a strong argument, though it does not and cannot deal completely with the objection, that mixed phenomena cannot prove an unmixed principle of benevolence. Paley's proof of the goodness of God falls short of the absolute benevolence of the Deity in orthodoxy. But this is no different from the same difficulty that he faced with regard to the natural attributes of God, and his justification of his position would be along similar lines.

1 William Paley, Works (1838), 176

2 Ibid.

3 Ibid., 177

Natural theology is not an end in itself. It is but a stepping stone to revelation and "the true theist will be the first to listen to any credible communication of divine knowledge".¹ The value of natural theology is that it points towards revelation and creates the attitude and frame of mind disposed to attend to revelation. It can be argued that the decline in Christian religion in the West has accompanied, and followed upon, a decline in natural theology since the middle of the last century, when such arguments as Paley's began to be unfashionable. H.E. Root in his essay in Soundings similarly suggests the close interdependence of natural theology and revelation:

It could be argued that the attrition and death of natural theology could not but be a prelude to the death of all theology, and even of faith, in so far as faith has any conceptual content and is not simply a matter of feelings and postures. It could further be argued that the health of Christian belief, in any period, can be measured by the health of that natural theology on which it not always visibly depends.²

This is a judgement with which Paley would have generally agreed. He claimed neither too little nor too much for natural theology. He realized that the understanding of God which emerged from it, while it did not measure up to the requirements of orthodoxy, nevertheless, provided limited confirmation of it, since the inferences drawn pointed with remarkable consistency in the direction of the God of orthodox Christian theology.

Frederick Ferré, in his comment on Paley, has put the matter very well when he said

He (Paley) is not, nor does he claim to be, building theology from the foundations upwards. On the contrary natural theology is a discipline which finds itself in a world, which, for centuries, has listened to the assertions of revealed theology concerning the nature of God. In such a world it is hardly possible to pretend, as Hume does, that theological investigations will be carried on as though no one had ever conceived of God as infinitely good; natural theology supplies (1) empirical data which tend to verify the hypothesis, and (2) theoretical considerations which serve to show why other data do not conclusively falsify the hypothesis. Hume's criticism at this point not only overlooks the methodological role of natural theology as seen by its practitioners, but also fails to recognise the legitimate importance of the hypothetical movement of thought within empirical methodology in general. He seems to presuppose a Baconian approach, long since abandoned by scientists, to the process of 'deriving' conclusions from facts. We have noticed that Paley on the other hand is aware of the role of intelligent judgement in inductive thinking as an indispensable complement to sheer observation.³

¹ William Paley, Works (1838), 193

² H.E. Root, 'Beginning all over again' an essay in Soundings (ed. A.R. Vidler; 1962), 6

³ Frederick Ferré, Introduction to Paley's Natural Theology (1963), xxii & xxiii

H U M E, K A N T, A N D

T H E P H I L O S O P H I C A L C R I T I Q U E

During the eighteenth century it was almost universally assumed that religion, and in particular belief in the existence of God, had been conclusively established by the design argument in conjunction with the advances in science since the previous century. Therefore all informed and intelligent men must be theists. It could only be as a result of ignorance that unbelief could prevail. Locke had earlier expressed the matter in this way. "For the visible marks of extraordinary Wisdom and Power appear in all the Works of Creation that a rational Creature, who will but seriously reflect on them, cannot miss the discovery of a Deity." ¹ Newton, that great scientific authority of the age, had lent his weight to the certainty of the argument. Colin Maclaurin, Newton's illustrator, wrote in his book An Account of Sir Isaac Newton's Philosophical Discoveries:

His [God's] existence and his attributes are, in a sensible and satisfactory manner, displayed to us in his works; ... From our existence, and that of other contingent beings around us, we conclude that there is a first cause, whose existence must be necessary, and independent of any other being but it is only a posteriori that we thus infer the necessity of his existence, and not in the same manner that we deduce the necessity of an eternal truth in geometry ²

Thus the design argument while being recognised as a posteriori, and, therefore, not carrying with it the finality of deduction, was nevertheless regarded as being so conclusive and strong as to be virtually self-evident.

This encouraged theologians like Samuel Clarke to speak of it in similar terms, and to declare that the contemplation of the works of creation, the form and structure of our bodies, and the faculties of our mind, could be sufficient to convince everyone of the existence of an all-wise, supreme Being, who is the author of such things:

¹ John Locke, An Essay Concerning Human Understanding (ed. EH. Nidditch), 89

² C. MacLaurin, An Account of Sir Isaac Newton's Philosophical Discoveries (1748)

no Man of the meanest Capacity and greatest Disadvantages whatsoever, with the slightest and most superficial Observation of the Works of God, and the lowest and most obvious attendance to the Reason of Things, can be ignorant of Him, but he must be utterly without excuse. 1

Kant himself makes reference to the supposed finality and conclusiveness that were ordinarily associated with the Design Argument when he wrote in the Critique of Pure Reason, "... we cannot approve of the claims which this argument advances to demonstrative certainty and to a reception on its own merits, apart from favour or support from other arguments." 2

It is fair to say that Paley did not regard it in this light nor claim that it offered demonstrative certainty. He was, as McPherson has pointed out, very cautious: "The argument as he sees it has its place against a background of faith. It is most unlikely to prove God to someone who does not already believe in God." 3 The significance of the argument was for him much more general and pervasive than that of a straightforward conclusion inferred from certain premises. Its effect might even be described as impressionistic, since he devotes a long paragraph in the conclusion of his Natural Theology to the "impression" gained from study of the argument. It needs, he remarked, like a medicine to get into the system. "It is one thing to assent to a proposition of this sort; another, and a very different thing, to have properly imbibed its influence." 4

Thus Paley may have much more in common with the conclusions of Kant and Hume regarding the logical character of the design argument than is commonly thought to be the case. It is clear that one of the main purposes of Hume's attack upon the argument in the Dialogues was to destroy the conclusive character it enjoyed amongst many theologians, and Kant also ventures to say, when criticising the "proof" of the argument, that it cannot

1 S. Clarke, A Discourse Concerning the Being and Attributes of God (fifth edition 1719), 154

2 I. Kant, Critique of Pure Reason (tr. J.M.D. Meiklejohn; second ed. 1934), 363

3 Thomas McPherson, The Argument from Design (1972), 71

4 William Paley, Works (1838), 192

injure the cause of morality to endeavour to lower the tone of the arrogant sophist and to teach him that modesty and moderation which are the properties of a belief that brings calm and content into the mind without prescribing to it an unworthy subjection. 1

In its tone and claims the natural theology of the seventeenth and eighteenth centuries had overreached itself. There are reasons for this; chief amongst them being the rapprochement between Newtonian science and religion which led to the "overweening confidence of the sophists" to whom Kant refers, and the conviction that the existence of God might be regarded as an "hypothesis" capable of empirical verification. This in turn led to the belief that he who could deny such incontrovertible evidence must be either a fool or a knave. This was something which Hume in particular deeply resented, and the main thrust of his argument, as indeed that of Kant, is to show that the argument from design has no such validity, though Kant treated it with greater respect and less irony than Hume.

I

Hume's attack on the design argument may be divided into four main points.

(1) The weakness of the analogy between the world and human artifacts.

Cleanthes in presenting the case for the argument from design speaks of the world as one huge machine subdivided into an infinite number of lesser machines. This curious adaptation of means to end in nature resembles, while greatly exceeding, the work of human thought and intelligence. Since, therefore, the effects are similar we may conclude that they derive from a similar source and that the world is the product of intelligence and design on the part of the Deity.

Philo's criticism of this is that the force of analogical reasoning is greatly weakened when there is any departure from the cases being compared. We may conclude when we see a house that it has an architect, a builder, because the case is exactly the same as many others that we have experienced. There is, however, a great gulf between ships, houses and machines, on the one hand, and the universe on the other. We should require experience of the production of a series of universes to have any confidence in the conclusions we might draw here from analogy.

1 Kant, op. cit., 363

Cleanthes makes no riposte to this criticism, apart from asserting the self-evident nature of design in the universe and drawing attention to the feeling, or impression, which is made upon the mind that this is so, from the contemplation of particular examples like the eye. This is not without significance in the light of what we have said about Paley's understanding of the total effect of the argument and not just its logical standing.

Replies have, however, been made to Hume's objection. John Hick, for example, remarks that this is not an argument conclusive against analogical reasoning, though it has weight against probability judgements. If a thing, i.e, the world, is seen to be like a clock in its design, etc., then it is perfectly legitimate, though unique, to consider that there is an analogy between the latter being the product of a purposive designer and the world being the creation of God. ¹

This counter-argument to Hume's objection is stated more fully by Nelson Pike in his commentary on the Dialogues. William Paley describes the eye as "adapted" for a function in its different parts as are the parts of a watch. The relation of parts, whether in an ear, eye, watch or ship, may be symbolized by (R).

While eyes and telescopes are very different from ears, circulatory systems, watches, houses, ships (which of course are all very different from one another as well) all of these objects share at least one common feature. Each is an ordered system of parts, that is, each consists of a set of parts that are 'adapted' to function as a unit, i.e. each consists of a set of parts that are arranged in a certain specifiable means-end relation (R). ²

The universe is, though totally inclusive, such a system demonstrating or exhibiting the relation (R) of its parts. It, therefore, is a candidate for inclusion in a species of systems (R).

¹ John Hick, Arguments for the Existence of God, 13

² D. Hume, Dialogues (ed. Nelson Pike), 150

Cleanthes' argument for the existence of God need not rest on an empirically established correlation between the class of worlds and the class of intelligently contrived objects. It can rest instead on an empirically established correlation between the class of ordered systems and the class of intelligently contrived objects. 1

Hume's objection, then, that before analogical reasoning in this realm can have any force we must have experience of a species of universes and their production appears to be arbitrary. It depends for its effect upon the obvious dissimilarities of the objects under comparison, while ignoring the points of resemblance, which are the real purpose of the analogy. Thus Nelson Pike concludes:

When everything is added together we emerge with a strong empirical correlation between the class of ordered systems and the class of objects that have been intelligently contrived. Much of our experience confirms this correlation; and that part of our experience which does not confirm it, at least does not disconfirm it. Given a strong empirical correlation between these two classes, we can now construct an 'argument from experience' that will yield a conclusion about the origin of any ordered system. For any member of the class of ordered systems, it is probable that it is also a member of the class of objects that have been intelligently contrived. But the universe as a whole is an ordered system. It follows that the universe as a whole was most probably designed and created by an intelligent being. 2

It is suggested by some critics of Hume that he was not altogether unaware of the weakness of the objection that he had put into the mouth of Philo, and that when he comes to part XII of the Dialogues he seems to recognise that he has earlier made "excessively strict" requirements of analogy. This view is taken by Anders Jeffner in his work Butler and Hume on Religion. In Part XII, he argues, Hume seems to give the argument from design some justification.

1 D. Hume, Dialogues (ed. Nelson Pike), 151

2 Ibid., 151 & 152

McPherson makes the same point succinctly in his discussion of this part of Hume's argument. We may grant that the argument from design argues from the universe considered as unique, but the class of the analogy is not a series of universes, but machines. The one and only universe seems to resemble a watch, etc. It is concluded that it resembles it also in having a designer. The preponderance of opinion, therefore, appears to be against Hume on this point.

A second line of reply put forward by McPherson suggests that the universe be considered in its separate parts, and not as one and unique. This approach would certainly come more closely into line with that of Paley, who was more interested in the cumulative effect of particular illustrations of design than in the totality of the universe considered as a single entity. Indeed, this aspect of the argument plays little part, if any, in his thinking.

I think it is Hume's view that Cleanthes' argument, which is based upon organisms, cannot be rejected out of hand as invalid, in view of the disparity between the things compared. 1

(2) Hume's insistence in the early chapters of the Dialogues upon the supposed weakness of the analogy between the world and human artifacts led him to argue that there may be many other equally valid ways of accounting for the order that we experience in the universe. "In this little corner of the world alone, there are four principles, reason, instinct, generation, vegetation, which are similar to each other and are the causes of similar effects." 2 Any one of these, therefore, may be invoked to explain the order and design that we perceive in the world. It is "a palpable and egregious partiality", Hume insists, to show a preference for reason in view of what he regards as the disparity in the analogy between products of human intelligence and the universe. What is this little agitation of the brain we call thought, that it should be given priority over all else? It is not less intelligible or conformable to experience to attribute the origin of the universe to vegetation, or generation, than to design or contrivance.

A tree bestows order and organization on that tree which springs from it, without knowing the order: an animal in the same manner on its offspring: a bird on its nest: And instances of this kind are even more frequent in the world, than those of order which arise from reason and contrivance. To say that all this order in animals and vegetables proceeds ultimately from design is begging the question. 3

It is, therefore, Hume argues, a quite arbitrary choice as to which of these principles is taken as the basis of a cosmogony. Generation, however, is regarded by him as having this advantage over reason; that it is consistently seen to give rise to the latter.

1 Anders Jeffner, Butler and Hume on Religion, 154

2 D. Hume, Dialogues Concerning Natural Religion (ed. N.K. Smith), 220

3 Ibid., 221

Despite the subtlety and skill with which Hume presents this argument the analogy between the world and animal generation is, as McPherson remarks, not at all obvious and if one takes into account the solar system it is rather more like a watch than anything else.¹ However, the best reply that is made to Hume is to be found in the works of Paley himself. The idea of attributing order in the world to generation, rather than intelligent and purposive design, was a common one in the eighteenth century, and Paley takes account of it in his argument.

"The minds of most men are fond of what they call a principle", says Paley, "and the appearance of simplicity, in accounting for phenomena." But, in fact, this term, when it is employed, stands for a most complicated operation in which all the many parts engaged must function together and in harmony. Generation is such an operation, and the simplicity resides in the name only. Yet, "give a philosopher this and he can get on." He does not reflect upon the complexity, the delicacy and multiplicity of the parts and actions that must be carried on in order to bring the operation to a successful result. The whole is "wrapped up in a single term, generation" which is then set down as "an elementary principle" and thought capable of sufficiently explaining the origin of things without the necessity for an intelligent Creator.²

"The truth is", Paley argues, "generation is not a principle but a process."³

1 T. McPherson, The Argument from Design, 57

2 William Paley, Works (1838), 158

3 "Hume could not demolish the design axiom for want of an alternative hypothesis to account for cosmic order. Not quite seriously he suggested 'generation' as an alternative principle of ordering, revealed in experience, and he speculated that the universe might be as well compared to an animal, or even a vegetable as to a machine. That would not do, of course, since 'generation' - a process, the mechanisms of which were entirely unknown in Hume's day - was precisely the principal fact that design was invoked to explain."

W.I. Matson, The Existence of God (1965), 100

We do not call spinning and weaving and the manufacture of goods principles, and thereby dispose of the necessity for thought and intention and design to be involved in their production. Yet by dignifying the process of generation with the title of a 'principle' it is thought that it is possible to exclude design in this case.

Paley's argument is further strengthened by his insistence upon the fact that that which is generated is related to that which is not. Organic animal bodies produced by generation bear a relation to the inorganic elements of the world which are not the result of generative processes. If it were merely a case of one part of a generated body bearing a relationship to another part of the same body, or of generated bodies being in relationship to each other as is the case with the sexes of the same species, it might be argued that the whole of this correspondence is the result of generation. But this is not so, and the argument from generation has to account for this relation that the organic bears to the inorganic. 1

If in answer to this it is said, as in effect Hume argues, that the whole world is the result of generation, then Paley answers that he does not understand the proposition; that, indeed, it is without meaning. For if the term generation signifies something quite different from what it ordinarily means, then it may, by the same latitude, signify anything.

In which case a word or phrase taken from the language of Otaheite would convey as much theory concerning the origin of the universe, as it does to talk of it being generated. 2

In other words the analogy for which David Hume shows such a marked preference is so remote as to be meaningless. Paley maintains the superiority of the analogy based on intelligence and design. It is one which is familiar, and experimentally justified, yet rejecting this we are invited to resort to novelties and absurdities. The only reason for this, in Paley's opinion, is the hubris of superior intellects, who cannot rest satisfied with sound, but familiar explanations.

1 See further discussion of this in Chapter 7

2 William Paley, Works (1838), 159

The choice, therefore, of the principle, or rather analogy, upon which one is to base one's cosmogony is not such an arbitrary matter as Hume would make out. While both Hume and Kant queried to what extent the analogy between products of nature and those of human contrivance is a legitimate one, it must be remembered, that Kant, himself, while attacking the argument from design in the Critique of Pure Reason, goes so far as to say:

if we are to discuss the subject at all we cannot proceed more securely than with the guidance of the analogy, subsisting between nature and such (artificial) products of design - these being the only products whose causes and modes of origination are completely known to us. Reason would be unable to satisfy her own requirements, if she passed from a causality which she does know to obscure and indemonstrable principles of explanation which she does not know. 1

Paley's reasoning is along identical lines, as we have seen.

Frederick Ferré in his introduction to Paley's Natural Theology comments:

The assertion that the analogy based on intelligence is the only experimentally justified one, as against Philo's (Hume's) superfecundity of alternatives (and particularly against the alternative of sheer, unconscious 'generation') is stoutly maintained by Paley in one of the most thoughtful replies ever given to Hume's attack on this point. 2

"Generation" if used as an explanation of the whole universe requires redefinition, otherwise it is rendered quite meaningless.

(3) Hume's third objection to the design argument occurs in the fourth part of the Dialogues where he invokes the argument of infinite regression against it, i.e. that the attribution of the order that is in the world to a prior plan in the mind of the Creator explains nothing, for we then, in turn, have to explain the order or design in the mind of God. If we trace the material world into an ideal world have we not

the same reason to trace that ideal world into another ideal world ...
But if we stop and go no further; why go so far? Why not stop at the material world? How can we satisfy ourselves without going on ad infinitum? 3

1 I. Kant, Critique of Pure Reason, 364

2 Frederick Ferré, Introduction to Paley's Natural Theology xxv

3 D. Hume, Dialogues, 199 & 200

Hume derived this argument from Strato, through his reading of Bayle. Among the Hume manuscripts preserved by the Royal Society of Edinburgh are memoranda, consisting mainly of notes on reading and probably written ... prior to 1741. They contain keynotes of the Dialogues. One such note runs:

Strato's atheism the most dangerous of the ancient - holding the origin of the world from nature, or a matter endued with activity. Bayle thinks there are none but the Cartesians can refute this atheism.

A Stratonician could retort the arguments of all the sects of philosophy ... The same question - why the parts or ideas of God had that particular arrangement? - is as difficult as why the world had. 1

This same argument is employed by Philo in many different ways in the Dialogues, and can be taken to represent Hume's own standpoint. To explain order in the world by a plan in the mind of God is of no significance to him.

How could things have been as they are, were there not an original inherent principle of order somewhere, in thought or in matter? And it is very indifferent to which of these we give the preference. 2

An ideal system, arranged of itself, without a precedent design is not a whit more explicable than a material one, which attains its order in a like manner; nor is there any more difficulty in the latter supposition than in the former. 3

Cleanthes makes two replies to these arguments of Philo's, which do not appear to be of much importance from the context, since, as it stands, it would seem that Philo is intended to triumph. However, the trouble is that he does not, for there is more to both the answers that Cleanthes makes than is apparent from the account that is given of them in the Dialogues. The first is along the lines of the logic of explanations generally. Cleanthes argues, when pressed, that one explanation does not require another in order to be satisfactory, i.e, we have not to explain everything before we can explain anything. Nelson Pike comments on this:

As Cleanthes said at the outset, the principle working in Philo's line of thinking is much too 'rigid' to be correct. It is a principle that is not in accord with the criteria we use when evaluating explanations - neither everyday explanations, nor explanations occurring in the sciences. 4

1 J.H. Burton Life and Correspondence of David Hume,/I, 134 -5 (1846)

2 D. Hume, Dialogues, 216

3 Ibid., 203

4 D. Hume, Dialogues (ed. Nelson Pike), 162

The second answer which Cleanthes makes is probably the more conclusive. Having reasoned from the design of the world to God, he is content to stop there, for this satisfies him in a way that the unexplained material universe does not. There is a great deal more in this apparently unreasoning reply than is at first clear, and it contains some of the fundamental grounds for resorting to the design argument at all. The first is this: An unexplained universe may be difficult to accept, but not an unexplained God, for the very meaning of the name 'God'

means a free, untrammelled spirit, who is all that he sees it best to be. The explanation of what he is lies in himself. To look for an explanation behind or above or outside him is useless ... God means the most basic, most self-explanatory of beings there is. If we found a good reason for supposing that the Maker of the universe was not the basic reality should we not deny to him the name of God ? 1

A similar point is made by Ian Ramsey when he argues that the name of 'God' acts as a 'logical stop-card'. It marks the completion of a chain of reasoning from cause or design, and to ask, what is the cause of God, or the reason for the design in the mind of the Creator, is to fail to understand the logical significance of such a statement. It is to require that God be something other than he is - a self-sufficient being - which is a contradiction in terms.² Thus, while an unexplained universe is a problem for the mind of man, an unexplained God is not. This is to a large extent the answer to Hume's query, why go so far ? Why not stop with an unexplained order in the world ? And to some degree a vindication of the attitude we find in Cleanthes, who says that having found God, he is content to stop.

But there is even stronger justification for this position, when we consider what other philosophers have said of the argument from infinite regress. In his Critique of Teleological Judgement, Kant deals specifically with the objection raised by Hume in these words:

1 Austin Farrer, A Science of God, 35

2 I.T. Ramsey, Religious Language, 63

In reply to those who feel obliged to adopt a teleological principle of critical judgement, that is, an architectonic understanding in the case of all such physical ends, Hume raises the objection that we might ask with equal justice how such an understanding is itself possible ... But there is nothing in this point. For the whole difficulty that besets the question as to the genesis of a thing that involves ends, and that is solely comprehensible by their means, rests upon the demand for unity in the source of the synthesis of the multiplicity of externally existing elements in this product. For, if this source is laid in the understanding of a productive cause regarded as a simple substance, the above question, as a teleological problem is abundantly answered, whereas if the cause is merely sought in matter, as an aggregate of many externally existing substances, the unity of principle requisite for the intrinsically final form of its complex structures is wholly absent. 1

Here we find Kant making the same point as that which we have already noted; which is, that the explanation of purposive design in terms of mind does not itself stand in need of further explanation in the same way as evidence of purposive design does when it is encountered in physical objects. It is not the designing mind that is inexplicable, but the arrangement of matter in a reciprocal unity of parts. In the latter the reason or cause of such arrangement is wholly lacking, whereas in the former, which is capable both of comprehending and creating such order, it is not. Mind or intelligence does not stand in the same logical category as matter and does not call for the application of the same rules. Therefore, to refer the purposive design that we encounter in the world to an intelligent Creator does not require a further explanation of design in the mind of God and involves no such infinite regress as Hume envisaged.

Hume, then, would appear to be wrong in stating that

a mental world or universe of ideas requires a cause as much as does a material world or universe of objects; and, if similar in its arrangement, must require a similar cause. 2

The difference between matter and mind, or spirit, is so profound and significant that they cannot be treated in the same way.

1 I. Kant, Critique of Teleological Judgment (tr. J.C. Meredith; 1928) 80 & 81

2 D. Hume, Dialogues (ed. N.K. Smith), 198

(4) The Epicurean hypothesis. Hume's reason for reviving this and presenting it as an alternative to the design argument in the Dialogues is not quite the same as the earlier objections he has raised. Those were "serious" objections in the sense that, as far as we can judge, he entirely assented to them himself. The Epicurean hypothesis does not have the same standing. His purpose in introducing it here is simply to show that it is possible to propose other systems of cosmogony that bear some faint appearance to truth, and that, since all analogies labour under some difficulty or other, the safest course is scepticism.

The Epicurean hypothesis he acknowledges to be "justly esteemed the most absurd system that has yet been proposed", yet with some slight alterations it might be put into the field alongside other arguments and made, in some degree, to account for the order that is in the world. The terms of the theory are that a fixed number of particles are subjected to continual movement and rearrangement. Since they are only capable of a finite number of transpositions, in the course of time, all possible forms and arrangements will be gone through. Therefore the form of the world as we know it now is a possibility under such a system. It is also assumed that at some point a certain stability will come over the process, and that after "many ages in a continued succession of chaos and disorder" it may at last settle to some kind of order in which the activity and fluctuation of the atoms is not lost, but a uniform appearance is maintained. The forms that will so emerge will be the forms best suited to survive and possessing the greatest stability. Therefore, it is pointless to ask about the adjustment of parts of organisms and their suitability to their environment, for some such adjustment they must have, if they are to exist at all.

We have already commented upon this theory and Paley's answer to it in Chapter One. Hume is conscious that the argument from chance carries little conviction.

On this theory the world is accounted for as the final result of what must be the equivalent of an infinite number of throws of the dice. But the chances against this are enormous. It cannot, of course, be said to be literally impossible, as it is not literally impossible for a font of types to be thrown in the air and come down in the form of one of Shakespeare's sonnets; but it is next to impossible. R.G. Swinburne writes of this part of Hume's argument: "An appeal to chance to account for order becomes less and less plausible, the greater the order. We would be justified attributing a typewritten version of collected works of Shakespeare to the activity of monkeys typing eternally on eternal typewriters if we had some evidence of the existence of an infinite quantity of paper randomly covered with type, as well as the collected works. In the absence of any evidence that matter behaved irregularly at other temporal periods, we are not justified in attributing its present regular behaviour to chance." 1

But even if we accept the Epicurean hypothesis of the emergence of form and order in the universe after countless myriads of chaotic combinations of the atoms constituting it, we still do not get rid of the proof of design. Why was it that the atoms failed to combine in a stable and balanced form before the final stage was reached? Was it attributable to something in their structure and nature, which prevented this happening, and determined that any one of the many countless combinations would be productive of such order? And if this is so what is to prevent the teleologist asserting that they were so designed originally as to produce the present state of the ordered universe and no other; and that the atoms present the same evidence of design that the outcome of their revolutions presents? Thus the Epicurean hypothesis instead of removing the evidence for design simply takes it one stage further back. 2

1 R.G. Swinburne, "The Argument from Design", Philosophy, XLIII (1968), 211

2 Bacon says of the Epicurean hypothesis, "that school which is most accused of atheism doth most demonstrate religion; that is, the school of Leucippus and Democritus and Epicurus. For it is a thousand times more credible, that four immutable elements and one immutable fifth essence, duly and eternally placed, need no God, than that an army of infinite small portions or seeds unplaced should have produced this order and beauty without a divine marshall." Francis Bacon Essays, XVI Of Atheism, Everyman's Library (1968), 49

Hume's restatement of the Epicurean hypothesis has been regarded as a speculative anticipation of the theory of evolution by means of natural selection developed by Darwin a century later. It is interesting, therefore, to see how someone like T.H. Huxley, the apostle of Darwinsism and himself a vigorously deterministic thinker, nevertheless pointed out that

the teleological and mechanical views of nature are not necessarily mutually exclusive for the more firmly the mechanist assumes a primordial molecular arrangement of which all the phenomena of the universe are the consequences, the more completely he is thereby at the mercy of the teleologist who can always defy him to disprove that this primordial molecular arrangement was not intended to evolve the phenomena of the universe. 1

The most the Epicurean theory does is to take the proof of design back a stage, but it does not succeed in driving the teleologist from the field. F.R. Tennant's reconstruction of the argument from design in the 1920s is evidence of that; the second main point that he makes in his complex restatement of the argument is that of "plan in the primary collocations". The sting of Darwinism for the traditional form of the design argument, he asserts, lay not in the gradualness of construction of organic bodies, (for gradualness of construction is in itself no proof of absence of design) but in the assignation to secondary causes of that which had formerly been attributed to direct divine intervention.

But the fact of organic evolution, even when the maximum of instrumentality is accredited to what is figuratively called natural selection, is not incompatible with teleology on the grander scale; as exponents of Darwinism were perhaps the first to recognise and to proclaim. 2

The grander scale of teleology sees design in the evolutionary process itself.

The survival of the fittest presupposes the arrival of the fit and throws no light thereupon. Darwin did not account for the origin of variations: their forthcomingness was simply a datum for him ... in the absence either of a mechanical or an 'internal' explanation of variation, room is left for the possibility that variation is externally predetermined ... the discovery of organic evolution has caused the teleologist to shift his ground from special design in the products to directivity in the process, and plan in the primary collocations. 3

1 F. Darwin (ed.), Life and Letters of Charles Darwin, II, 201 & 202

2 F.R. Tennant, Philosophical Theology, II, 84

3 Ibid., 85

How far we wish to endorse Tennant's ideas is not important here; the point which he makes is sufficient to show that it is theoretically impossible to banish the concept of design from the argument, whichever form the Epicurean hypothesis takes, whether it be that expounded by Lucretius or Darwin.

Robert Boyle, in the seventeenth century through his 'corpuscular philosophy', had advocated a mechanical theory of the universe. He was however careful to distinguish it from that of the Epicureans. Boyle considered that the basis and explanation of all material things was matter and motion. But he did not suppose that when "God had put into the whole mass of matter an invariable quantity of motion, he needed do no more to make the universe; the material parts being able, by their own unguided motions, to throw themselves into a regular system". He did not believe in random selection or chance concatenation of particles, but that in the beginning God "so guided the various motion of the parts ... as to contrive them into the world he designed they should compose". Those rules of motion, which we call 'laws of nature', once being established, and upheld by general providence, are capable of producing all the phenomena of the physical world. ¹

Boyle thought that it added to man's notion of God's supremacy to think that God had created the world by creating matter and motion and natural law, and that it did not require a series of miraculous interventions to keep it going.

Any agent, whether it be natural or supernatural, which operates upon bodies does so, Boyle maintained, according to the natural laws governing physical entities. Corn can be ground in a mill by water, horse or hand power, i.e. by inanimate, brute or rational agents, but the effect is the same. "And if an angel himself should work a real change in the nature of a body, 'tis scarce conceivable to men how he could do it without the assistance of local motion", without working through the process of natural law. ²

¹ The Excellency and Grounds of the Mechanical Hypothesis (1674) taken from Peter Shaw's abridgement (1725) II, 187

² Ibid.

Thus Boyle believed that a mechanical theory of the universe embraced all other theories and explanations, yet at the same time did not dispense with the notion of a Supreme Creator whom he conceived as working with and through the laws he himself has created. Both teleology and mechanism have their due place in Boyle's theory.

If, then, after the acceptance of the Epicurean hypothesis, for the sake of argument, there remains "plan in the primary collocations"; if the proof of design is not removed, but only taken a stage further back, we may turn Hume's earlier objection against himself and ask, why it is not possible to admit design in the world in the first place? Why go so far as to trace the world of natural objects into the world of atoms and molecules? If there is design in these, the secondary causes which produced them, there is design in the natural objects themselves. It is really a matter of indifference which illustrations of design you choose to accept.

These four arguments summarize the main points of Hume's philosophical critique of the argument from design in the Dialogues. Before assessing their importance and influence, both philosophically and historically, we must consider that other great philosopher of the eighteenth century, Immanuel Kant, and his criticism of the design argument.

II

We shall consider first Kant's brief treatment of the teleological argument in the Critique of Pure Reason, which is simpler than his extended discussion of it in the Critique of Teleological Judgement.

Kant acknowledges his debt generally to David Hume when he remarks that it was he who awoke him from his "dogmatic slumbers", but more particularly he derived from him the main criticism of the teleological argument.

The manuscript of Hamann's translation of the Dialogues brought them to Kant's notice in 1780 (i.e. the year following their first appearances), on the eve of the publication of his Critique of Pure Reason ... he at once incorporated (Hume's main criticisms) in his discussion of the teleological argument in his final revision of the Critique. They were also among the influences leading Kant to a reformulation of the problems of teleology in his Critique of Judgement. 1

Kant entertained great respect for the teleological argument not only because it was, as he put it, "the oldest, the clearest and that most in conformity with the common sense of humanity", but also because it stimulates interest in and the study of nature. It brings to nature an awareness and discernment of aims and purposes, which would not otherwise be observable, and draws the mind on to conclude that there is a principle of unity behind the phenomena of the natural world.

He was also impressed by its remarkable resilience in the face of doubts proposed by philosophical speculation. In this situation it renewed its strength by contemplating the wonderful forms of nature and the majesty of the universe, by fresh consideration of examples of contrivance in the world, which bore in upon it with a cumulative force. This was the answer that Cleanthes gave to Philo in the Dialogues. Scepticism is met by the citation of more, and yet more wonderful examples of design in nature, and while inference and argument are employed, appeal is also made to the immediate impression and sensations that these create upon the mind. All this, Kant recognised, gave the argument a force which could not be denied.

Yet, and this was the important point he wished to make in common with Hume, it did not amount to demonstrative certainty. The way in which the argument had been deployed in the seventeenth and eighteenth centuries had, as we have already seen, tended to carry with it this assumption. Such a claim was unfounded, and it would do the argument itself no harm to expose the falsity of this claim.

1 D. Hume, Dialogues (ed. N.K. Smith), 39

Kant brings two objections against the supposed demonstrative certainty of the teleological argument in both of which we see the influence of Hume.

First, he argues that at most it can only demonstrate the existence of an architect of the world, but not a creator. Man has no experience of creation ex nihilo. Therefore, it is a 'limiting concept'. Analogies of human craftsmanship, or so-called 'creative' genius, do not extend far enough for this. To create, in the primal sense in which it is applied to the activity of the Deity, requires contingency of matter or substance as well as form, and that calls for a 'transcendental argument' which the physico-theological was expressly constructed to avoid: ergo, it cannot demonstrate an all-sufficient being. ¹

Secondly, we may only infer a cause proportionate to the effect. It cannot be asserted that the world as we know it could not exist without absolute power, the highest wisdom and total unity. Anything less than this is indeterminate.

Physico-theology is, therefore, incapable of presenting a determinate conception of a supreme cause of the world, and is, therefore, insufficient as a principle of theology - a theology, which is itself to be the basis of religion.

The attainment of absolute totality is completely impossible on the path of empiricism. And yet this is the path pursued in the physico-theological argument. ²

The principle of causality, Kant argues, cannot be extended beyond the empirical to an object which can never be an object of possible experience, for then it becomes speculative, and is useless and meaningless when diverted from its proper destination.

If the empirical law of causality is to conduct us to a supreme Being, this Being must belong to the chain of empirical objects - in which case it would be, like all phenomena, itself conditioned. ³

1 I. Kant, Critique of Pure Reason, 365

2 Ibid., 366

3 Ibid., 370

Kant, therefore, concludes that a rational theology cannot be constructed upon the application of the principles of reason to nature, for they do not conduct us to any theological truth, but it must be founded rather upon the laws of morality. If we were to admit the possibility of passing the bounds of experience by virtue of the dynamic relation of cause and effect, we should still not be confronted with the conception of a Supreme Being,

because experience never presents us with the greatest of all possible effects, and it is only an effect of this character that could witness to the existence of a corresponding cause. 1

If, similarly, we are to admit the right of Reason, as a purely speculative enterprise, to assert the existence of a perfect and absolutely necessary Being it would be as a result of favour rather than demonstration. The value of the physico-theological proof, therefore, in Kant's view, lies not in its power to establish conclusively the existence of a Creator, for this it has been shown not to possess, but rather in the way it "prepares the mind for theological cognition and gives it a right and natural direction." 2

It is this last sentence of Kant's in the Critique of Pure Reason, which is the clue to his fuller treatment of the design argument and its wider significance for natural theology in the Critique of Teleological Judgement, and it is to that that we now turn.

III

The Critique of Teleological Judgement

(a) The Analytic: Kant distinguishes, first, between purely formal and material teleological judgements. Examples of the former are geometrical figures and the principles that underlie their construction. In the unity and compatibility of the principles involved we discern a sort of teleological relationship, but it is, as Kant puts it, 'a purposiveness without purpose'; it is purely formal and intellectual, not real. "In other words it is a finality (purposiveness) which does not imply an underlying end, and which, therefore, does not stand in need of a teleology." 3

1 I. Kant, Critique of Pure Reason, 370

2 Ibid.

3 I. Kant, Critique of Teleological Judgement, 9

Thus finding order and regularity in mathematics is different from encountering them in the real world, in "external things", "in the trees, flower beds and walks of a garden", for instance, which is something "I cannot hope to deduce a priori from any delineation I may make of space according to some rule out of my own head".¹ I may, therefore, legitimately enquire about the "finality" or purposiveness of the latter, which is material not formal, and whose teleology must in consequence lie outside the confines of "my own a priori representation".² Into this conception of material purposiveness Kant introduces the distinction between ends which are relative and those which are intrinsic. An object in nature may be regarded as serving a relative purpose if it is viewed as a means which other causes use in the pursuit of ends. This he terms "utility" where human beings are concerned, but "adaptability" in the case of other creatures. An example he uses is the deposit of alluvial mud at the mouths of rivers, which in turn becomes the means for the production of vegetation for the benefit of man. Indeed, what we witness throughout nature is a nexus of such relative ends and means, "for each intermediate member (of the series) must be regarded as an end, though not a final end."³ The difference between this notion of merely relative purposiveness, which is accidental to the thing to which it is attributed, and that of intrinsic purposiveness resides in the fact that the latter is a purpose unto itself, as it were, "a purpose in nature (Naturzweck) without qualification".⁴ Kant gives us the provisional statement that "a thing exists as a physical end if it is (though in a double sense) both cause and effect of itself".⁵ This is the peculiar character and nature of an organism.

The illustration which Kant uses is that of a tree. In the first place, a tree produces another tree. In the successive generation of trees of the same genus we see the individual tree first as the cause and then the effect, or vice versa.

1 I. Kant, Critique of Teleological Judgement, 9

2 Ibid. 11

3 Ibid., 14

4 S. Körner, Kant, (1955) 202

5 I. Kant, Critique of Teleological Judgement, 18

Secondly a tree produces itself as an individual. Growth, in an organic sense, is quite different from increase according to mechanical laws. The plant, by taking and bestowing upon the materials of nature a peculiar form and character, is both the cause and effect of itself. Thirdly, we see in such products of nature a mutual dependence and relationship of the parts. The leaf is dependent upon the branch, but so is the branch upon the leaf, for repeated defoliation would destroy the tree.

An organism, then, represents a material, intrinsic purposiveness in nature in that it "stands to itself reciprocally in the relation of cause and effect."¹ It cannot be explained simply in terms of mechanical causation for this is invariably progressive and presupposes that the effect always follows the cause. The conception of an organism, however, requires that we also invert this order. It is "one in which the thing that for the moment is designated effect deserves none the less, if we take the series regressively, to be called the cause of the thing of which it was said to be the effect".²

Here we must distinguish between two kinds of material intrinsic finality (a) that of art and (b) that of nature. An art product is the result of human inventiveness and design.

It is the product, in other words, of an intelligent cause, distinct from the matter, or parts, of the thing, and of one whose causality, in bringing together and confirming the parts, is determined by its idea of a whole made possible through that idea, and consequently, not by external nature. ³

A product of nature, however, differs from an art product in that it is not merely an organized, but a self-organized being. The parts are not only reciprocally related, but produce each other. "An organized being is, therefore, not a mere machine". A machine has only motive power, but an organism has formative power, and is capable of organizing matter that is devoid of order. It cannot, therefore, be explained by the capacity of movement alone - by mere mechanism. ⁴

1 I. Kant, Critique of Teleological Judgement, 20

2 Ibid.

3 Ibid. 20 & 21

4 Ibid. 22

This examination of the concept of organism presents us with a new principle with which to investigate nature, which is, that "an organized natural product is one in which every part is reciprocally both end and means. In such a product nothing is in vain, without an end, or to be ascribed to a blind mechanism of nature".¹ For all practical purposes this principle stands on the same footing as the fundamental principle of all natural science that nothing happens by chance, that every event has a cause. From a critical point of view, however, as Kant makes clear, there is a profound difference.

The Category of causal connexion can be schematized; the notion of purpose in nature cannot. To schematize a Category is ... to exhibit the temporal conditions of its applicability - permanence in the case of Substance, existence at a certain time in the case of Reality, etc. The schema of causality consists 'in the succession of the manifold in so far as it is subject to a rule'. Regular succession, in other words, is a perceptual feature in the absence of which there can be no causal connexion. Teleological connexion is not similarly linked to a temporal condition or, for that matter, to any other definite feature of pure or empirical perception. We cannot indicate any necessary perceptual condition for the application of 'purpose in nature'. The notion has no schema. 2

This is the ground for Kant's assertion that the notion of purpose in nature is regulative not constitutive. It is only the categories of the Understanding which can be constitutive of objects, not the Ideas of Reason. The former are expressed by synthetic a priori judgements, the latter by maxims. The maxims are rules, the observation of which enables us to systematize our knowledge of empirical reality, but are nevertheless subjective.

The Idea, therefore, of purpose in nature which arises from our conception of organisms is expressed in the maxim "An organized product of nature is that in which everything is reciprocally both means and end." "From it there follow two corollaries, which as methodological rules are, at least for heuristic reasons, observed by biologists, namely, (a) the maxim that 'nothing in such a being exists in vain' and (b) the maxim that 'nothing happens merely by accident (von ungefähr, without purpose)'. Since maxims are rules of procedure it

1 I. Kant, Critique of Teleological Judgement, 25

2 S. Körner, Kant, 204

would be more precise to say that they enjoin us to proceed on the assumption that, or better still as if, nothing in an organism existed in vain, or happened merely by accident. All this does not prejudice the possibility of explaining some parts or functions of an organism by merely mechanistic laws".¹

Having arrived at the idea of purposiveness in nature from the study of organisms Kant now claims that it is permissible to apply this idea to the rest of nature, too. The mind is led on from the organism to consider the whole of nature as a kingdom of ends. Phenomenal nature may be tested by this idea to see whether it may be properly estimated as a system following the rule of ends. No violence is done to our objective, empirical knowledge of the world by this procedure. The maxim is merely a subjective principle. It is not asserted that things in nature are, indeed, designed so to be ends, but that the maxim of Reason requires us to adopt this assumption in our approach to nature as a whole. "Everything in the world is good for something or other; nothing in it is in vain, we are entitled, nay, incited, by the example that nature affords us in its organic products, to expect nothing from it, and its laws, but what is final (purposive) when things are viewed as a Whole".²

(b) The Dialectic. In this part of his argument Kant deals with the problem of the relation between a mechanistic explanation of nature and, in particular, organic nature, and the teleological estimation of it which he believes he has established. Are they mutually exclusive of each other? If an organized body can be explained mechanically does this preclude a teleological explanation, or, alternatively, if the two exist alongside each other does the one set a limit upon the other? A contradiction, or antinomy, Kant acknowledges, does arise if we treat these two as principles for the determinant judgement. They would then read thus; "Thesis: All production of material things is possible on mere mechanical laws. Antithesis: Some production of such things is not possible on mere mechanical laws", and in this way both could not be true.

1 S. Körner, Kant, 205

2 I. Kant, Critique of Teleological Judgement, 28

But if we treat them as maxims, which we are entitled to do, replacing the first with "All production of material things and their forms must be considered as being possible in accordance with merely mechanistic laws", and the second with, "Some products of material nature cannot be considered in accordance with merely mechanical laws (their consideration requires an altogether different law of causality, namely, that of final causes)," then the contradiction disappears.¹ We may then, upon the basis of the first principle, reflect upon nature as resulting from mechanical causes, and push our enquiry in these terms as far as possible, without prejudice to the second principle which invites us to reflect upon nature from a radically different point of view. These different estimations of nature result from the peculiar constitution of man's mind, and Kant leaves open the possibility that "in the inner basis of nature itself the physico-mechanical and the purposiveness nexus present in the same things may cohere in a single principle".^{2 3}

The explanation of chance, adopted by Epicurus, and that of necessary being advocated by Spinoza, Kant rejects as resolving the antinomy in the wrong way by denying or destroying the concept of teleology rather than explaining it.

1 S. Körner, Kant, 207 & 208

2 I. Kant, Critique of Teleological Judgement, 38

3 We may observe here a parity of reasoning between Kant and Francis Bacon on the relationship between efficient and final causes. The conclusion to which Kant came in the Critique was anticipated by Bacon in The Advancement of Learning. Bacon considered that the enquiry into final causes was misplaced in natural philosophy so that it prevented the discovery of efficient causes. Final causes must be kept within their own proper sphere which is metaphysical. If this distinction is not made there is a tendency to believe that there is a repugnancy between the final and the efficient, the teleological and the mechanical cause. Bacon argues that both are true and compatible "the one declaring the intention and the other the consequence only". If God chooses to work his final purposes in nature through secondary means this does not derogate from his glory. Thus we may pursue the investigation of mechanical causation without threatening the place of teleology. Francis Bacon, The Advancement of Learning. Ed. G.W. Kitchin, 98

Once teleological explanation has been adopted as a guide for the study of nature, then, as Kant has already pointed out, we must at least try this maxim of judgement on nature as a whole. We are impelled to in the case of those forms which manifest intrinsic purposiveness, but we are also led to subsume under the same rule the relative finality we observe in the natural world. In consequence both the popular mind and the philosopher are brought to consider the contingency of the universe, and to adopt the assumption that it "depends on and has its source in an intelligent being ... which exists outside the world: that teleology thus can find no completion of its enquiries except in a theology".¹

But now Kant poses the crucial question. Suppose teleology is developed to its highest pitch; what does it prove? Does it for example prove that an intelligent Being exists? This he answers with a categorical, No; "it proves no more than this, that by the constitution of our cognitive faculties ... we are absolutely incapable of forming any conception of the possibility of such a world unless we imagine a highest cause operating designedly." What we have stated is not something about the existence and character of the Deity, but something about our own mental constitution and mode of apprehending the world. There is something about our make-up which impels us to interpret empirical reality in this way. "Strictly speaking we do not observe the ends of nature as designed, we only read this conception into the facts as a guide to judgement in its reflection upon the products of nature."²

Were we to express the conclusion of the teleological argument objectively and dogmatically it would read - there is a God. But all we are permitted to say in the light of the critical philosophy is: We cannot conceive or render intelligible to ourselves the purposiveness we find in nature except by representing it, and the world in general, as the product of an intelligent cause, that is, a God. ³

1 S. Körner, Kant, 206

2 I. Kant, Critique of Teleological Judgement, 53

3 Ibid.

Kant does not think that much is lost by the transference of the argument and its conclusion from objective to subjective grounds. Despite the fact that we are unable to pass any judgement, affirmative or negative, upon the question of the objective existence of the Deity this much, he contends, is certain that "if we ought ... to form our judgement on what our own proper nature permits us to see ... we are utterly unable to ascribe the possibility of such physical ends to any other source than an intelligent Being. This alone squares with the maxim of our reflective judgement, and, therefore, with a subjective ground that is ineradicably fixed in the human race".¹

IV

Kant now turns to the method of applying the principle of teleology to our investigation of nature. As we have already noted, Kant's justification of teleology as a regulative idea does not prejudice the mechanistic explanation of natural phenomena. Indeed, he insists that this line of enquiry must be pursued as far as possible. In considering the possibility of the origin of organic life according to this rule he reveals an almost prophetic insight into the theory that Darwin himself was to develop as a mechanistic explanation of the origin of species in the next century. To quote Kant's own words,

When we consider the agreement of so many genera of animals in a certain common schema, which apparently underlies not only the structure of the bones, but also the disposition of their remaining parts, and when we find here the wonderful simplicity of the original plan, which has been able to produce such an immense variety of species by the shortening of one member and the lengthening of another, by the involution of this part and the evolution of that, there gleams upon the mind a ray of hope, however faint, that the principle of the mechanism of nature, apart from which there can be no natural science at all, may yet enable us to arrive at some explanation in the case of organic life.²

Here the natural scientist may, says Kant, go back as far as he can in seeking to trace the development of organic life according to the mechanistic principle, but when he has done all this he is eventually obliged to attribute to nature the constitution of an original organization

¹ I. Kant, Critique of Teleological Judgment, 54

² Ibid., 78

with a view to all these forms of life, for unless he does so, the possibility of the final form of the products of the animal and plant Kingdoms is quite unthinkable. 1

This is because, in Kant's view, organized matter is qualitatively different from inorganic matter and cannot be explained without remainder by the mechanistic principle. For this reason he aligns himself with the theory of epigenesis as expounded by Blumenbach, because "he makes organic substance the starting point for physical explanations of these formations. For to suppose that crude matter, obeying mechanical laws, was originally its own architect, that life could have sprung up from the nature of what is void of life, and matter have adopted the form of a self-maintaining finality, he justly declares to be contrary to reason". 2

Organisms, which Kant has explained must necessarily be thought of teleologically, can therefore only be derived from earlier organisms; and despite the fact that a long and inscrutable history of development may have taken place between the present organism and its original form, organic substance itself must have been the starting point for it. A theory of the gradual change and purposive development of organic life from a few original forms, or from one, is, therefore, perfectly compatible with Kant's understanding of teleology. But the development he insists must always be purposive, it cannot be accidental, or random, for that would result in parts of an organism being vain, or useless, and would contradict the fundamental principle of teleology. What Kant envisages is a generic development according to a certain inner necessity, or pre-determined pattern in the organism itself, yet one which is capable of adapting itself to external contingencies.

1 I. Kant, Critique of Teleological Judgment, 79

2 I. Kant, Critique of Teleological Judgment, 85 & 86

A theory of such development of all organic life may be "a daring venture", says Kant, but

it cannot be said to be absurd, like the generatio aequivoca, which means the generation of an organized being from crude inorganic matter. It never ceases to be generatio univoca ... it only implies the generation of something organic from something else that is also organic, although, within the class of organic beings, differing specifically from it. It would be as if we supposed that certain water animals transformed themselves by degrees into marsh animals, and from these after some generations into land animals. In the judgement of plain reason there is nothing a priori self contradictory in this. 1

Thus, because we are compelled to face the organic derivation of all organic forms, even if we accept the theory of development stated above, we cannot get rid of teleology. 2 For when the "archaeologist of nature", as Kant terms him, has attributed the development to the mechanical laws of nature

he has only pushed the explanation a stage further back. He cannot pretend to have made the genesis of those two Kingdoms (the plant and animal) intelligible independently of the condition of final causes. 3

There is, however, one reservation that Kant records regarding the theory of development of organic forms. Although it is "not a priori self-contradictory".

Yet

experience offers no example of it. On the contrary, as far as experience goes, all generation known to us is generatio homonyma. It is not merely univoca in contradistinction to generation from an unorganized substance, but it brings forth a product which in its very organization is of like kind with that which produced it, and a generatio heteronyma is not met with anywhere within the range of our experience. 4

1 I. Kant, Critique of Teleological Judgment, 79.

2 At first Darwin recognised the limit that this principle set upon his theory. He wrote in The Origin that life had been originally "breathed by the Creator into a few forms or into one". (Charles Darwin, The Origin of Species (Sixth edition), 403). By pushing back the question of 'creation', or origins in this way he hoped to get rid of the problem created for his theory by the appearance of design in organic nature. For all practical purposes this method was effective. Design no longer impinged upon the mind in the way that it had formerly done. Only a few critics observed that there must have been design in the original organic form or forms, but this passed largely unnoticed and unanswered.

3 Ibid., 80

4 Ibid., footnote

Kant now comes to consider the whole of nature as a teleological system. This, he has already argued, follows from the discovery of the principle of teleological judgement in the investigation of organic nature. An organism is seen to possess, or rather we are compelled because of the constitution of the human mind to regard it as possessing, a certain intrinsic purposiveness in the inter-relatedness of its parts and their functions. An organism, as an entity, however, may also be regarded as possessing an extrinsic purposiveness in relation to other things i.e. it may subserve another as a means to an end. And

even those things which do not possess any intrinsic finality, and whose possibility does not imply any, such as earth, air, water, and the like, may nevertheless extrinsically, that is in relation to other beings, be very well adapted to ends. 1

When we ask the question for what end a thing exists it may be answered in either of two ways. It may be said that the end for which a particular being exists is inherent in itself, in which case it is not merely an end, but also a final end; or we may say that the end for which it exists lies outside itself in other natural beings, in which case it is not itself a final end.

But if we go through the whole of nature we do not find in it, as nature, any being capable of laying claim to the distinction of being the final end of creation. 2

Let us suppose that the vegetable kingdom exists for the sustenance of the animal kingdom. We must then enquire: For what purpose do plant-eating animals exist? To which we may reply: In order to sustain flesh-eating animals. When we in turn ask, why all these preceding kingdoms exist, we may conclude that it is for man, that he is the ultimate end of creation here upon earth, because he is the only being capable of consciously formulating ends.

1 I. Kant, Critique of Teleological Judgment, 86

2 Ibid., 88 Here we need to be aware of the distinction Kant makes between a final end and an ultimate end. The former is unconditional, i.e., the purpose or end of its existence is, as he has explained, inherent in itself. The latter is an end which may be regarded as the final link in a chain of ends within nature itself, and therefore conditional upon it.

There are of course considerations that militate against this conclusion, such as the fact that the basal conditions of organic life, the soil, etc., would appear to have been produced without design, by the accidental interaction of physical forces. Since these basal conditions are the foundation of the system, of which man is viewed as being the crown, this cannot but reflect adversely upon such a conclusion. However, here Kant appeals to the principle of teleological judgment. Although we may give the utmost scope to explanations on mechanical lines, "we know we can never get home with such an explanation - not because there is an inherent inconsistency between the mechanical generation and an origin according to ends, but for subjective reasons involved in the particular type and limitations of our understanding". 1

Taking this into account, we have then "ample grounds" for regarding man as the ultimate end of nature. Not simply a physical end, such as all organized beings are, but the end in relation to whom all other natural things constitute a system of ends.² But now we must ask: "What is the end in man himself which is intended to be promoted by his connexion with nature? Two possible answers demand our consideration, they are happiness and culture.

Happiness, Kant considers, cannot be regarded as being this end. Man is incapable of framing for himself a notion of what true happiness is, and even if he were "his own nature is not so constituted as to rest, or be satisfied, in any possession or enjoyment whatever".³ But then again external nature is far from having made a particular favourite of man in this respect, he is subject to all the changes and misfortunes of the rest of the animal world, and there is the inner discord of natural tendencies that make him unhappy.

1 I. Kant, Critique of Teleological Judgment, 91

2 Ibid., 92

3 Ibid., 93

It is culture which, in Kant's view, is to be regarded as the ultimate end of nature in respect of the human race. It is culture which affords man a relative freedom from the exigencies of nature itself and his own natural inclinations; it creates the conditions under which he may develop his humanity and produce an aptitude for ends of his own choosing.

This ultimate end of nature as realized in man is to be distinguished from what Kant now goes on to discuss, which is the final end of creation itself. An ultimate end is something which is comprehended within nature, and has nature as its ground. "A final end is", as Kant himself defines it, "an end that does not require any other end as condition of its possibility".¹ It is to man regarded as noumenon that Kant turns in order to find this final end of creation.

He is the only natural creature whose peculiar objective characterization is nevertheless such as to enable us to recognize in him a supersensible faculty - his freedom - and to perceive both the law of the causality and the object of freedom which that faculty is able to set before itself as the highest end - the supreme good in the world. 2

It is man, considered as moral agent, who is the final end of creation, for he alone possesses within himself, in the unconditional legislation of conscience, the supreme purpose of his existence. In him, therefore, the whole chain of mutually subordinated ends which we discover in nature finds its ultimate point of attachment.

V

Physico-Theology: The place and value of the teleological argument for theology. First, Kant makes a point which is similar to that which Paley frequently emphasized, viz. that given a single example of design in the world we are compelled to go on and attribute its origin to an intelligent Creator. Kant, of course, qualifies his argument with the critical principle, which means that such a judgment is only valid subjectively.

1 I. Kant, Critique of Teleological Judgment, 98

2 Ibid., 99

Given, he says, but a single organized product of nature, then the structure of our cognitive faculty is such that the only source which we can conceive it to have is one that is a cause of nature itself - be it of entire nature or even only of this particular portion of it - and that derives from our understanding the requisite causality for such a product. 1

Yet although teleology can justify subjectively the conception of an intelligent world Cause acting designedly, from the evidence of organic nature, it can never become the adequate basis of a theology for two reasons. First, it is incapable of establishing a final end of nature, for this, as we have seen, must lie outside nature. "To the last it remains nothing but a physical teleology".² Secondly, while it sets before us the notion of a supreme Artist or Architect of the universe, it is unable to establish anything further about the character of such a Cause, which would be essential to a theology. It cannot lift us above nature to a definite conception of such an intelligence. Here it would appear that Kant and Hume are at one. The teleological argument affords some conception of a Supreme Designer, but leaves everything else about Him in obscurity. This latter defect serves almost to destroy the value of the positive conclusion.

Were the problem set in a lower key, it might prove easier to solve. If we were willing to rest content with the conception of a finite Deity, or Deities, then physical teleology would prove a sufficient basis for such a system of divinity; or if assuming much perfection in the attributes of the deity we felt entitled to take all possible perfection for granted then it might likewise have important claims to being the ground of a theology. Such an assumption, however, can find no justification in theoretical reason, which requires that the cause shall not exceed the effect. What has led natural theologians to espouse such conclusions is not the strict inference of the design argument, but the presupposition of a Supreme Being deriving from an a priori source, and which serves to make up its deficiencies in this respect.

1 J. Kant, Critique of Teleological Judgment, 101

2 Ibid., 102

When we saw this, we should not erroneously imagine that we had evolved this idea, and, with it, a theology by means of the theoretical employment of reason in the physical cognition of the world - much less that we had proved its reality. 1

Thus while physical teleology urges us to go in search of a theology it can never produce one itself, not even when it is helped out by ideas of pure reason, for nature alone cannot tell us anything about a final end of creation.

All the ends in the world are empirically conditioned and can contain nothing that is absolutely good but only what is good for this or that purpose regarded as contingent. 2

It is only pure reason that a priori can supply this knowledge of a final end, and instruct us in what attributes we are to assign to the supreme cause of nature and how we are to conceive its relation to nature as a teleological system. If this latter concept of a final end resting upon pure reason is removed then the basis of theology is taken away and the whole system collapses. Hence the a priori concept of a final end has logical priority over empirical arguments in the formation of a theology. This explains Kant's concluding remarks:

Physicio-theology is a physical teleology misunderstood. It is of no use to theology except as a preparation, or propaedeutic, and it is only sufficient for this purpose when supplemented by a further principle on which it can rely. But it is not, as its name would suggest, sufficient, even as a propaedeutic, if taken by itself. 3

VI

We have now reviewed in this chapter the two principal philosophical critiques of the design argument. What of it, if anything, remains after this searching examination? There are students of the subject who consider that nothing is left. Norman Kemp Smith, in his commentary on Hume's Dialogues, considers the refutation of the design argument in that work so complete that Hume is now seldom challenged.⁴ Similarly R.H. Hurlbutt regards Hume's criticism as totally destructive of the argument.

When the philosophical dust has settled not only the design argument, but natural theology in general, is found to be completely disarmed. 5

1 I. Kant, Critique of Teleological Judgment, 104

2 Ibid., 106

3 Ibid., 108

4 D. Hume, Dialogues, Ed. N. K. Smith, 38

5 R.H. Hurlbutt, III. Hume, Newton and the Design Argument, (1965), 135

The consequences of this have taken a long time to work themselves out, but today

no vital philosophical or theological school makes use of the design argument, scientific theism, or natural theology, in any of their traditional senses. No modern theology or philosophy breaches the logical wall erected by Hume, which divides science and theology, reason and religion. 1

The strange thing is, however, that despite those proclamations of total victory for philosophical criticism the argument from design has persisted and still does persist, in some form, both in theology and philosophy. F.R. Tennant and A.E. Taylor have both attempted reconstructions of it in the twentieth century. Recent criticism and assessment of the argument by Hick, Matson, McPherson and Swinburne also indicate that it is still a live issue both in theology and philosophy. Each fresh advance in thought, from Hume to Darwin, had been thought by some to result in the destruction of the argument, but still it survives; and this testifies to its remarkable resilience to which Kant, and even Hume who was more discerning than some of his disciples, paid tribute.

Eighteenth century philosophical criticism of the design argument resulted in the destruction of the power of demonstration that was formerly considered to attach to it. This we recall was the object of both Kant and Hume in embarking upon their criticism, but it is a much more limited objective than the total abolition of the argument.

In order that we might determine in what form the design argument survived the philosophical criticism of this period we must first recall the four main arguments of Hume against it, and judge their validity in the light of our discussion in the earlier part of this chapter; then in the second place we must consider and assess the significance of Kant's critique of the argument.

1 R.H. Hurlbutt, III, Hume, Newton and the Design Argument, (1965), xiv. Another example of the supposed effect of 18th Century philosophical criticism of the argument from design is to be found in C.E. Russett's The Reception of Darwin in America, p.35. "Design had been moribund before the Origin was even written. If Darwin slew Paley, surely it was a corpse rather than a living, breathing body of thought that was delivered up to destruction. Before Paley ever wrote, the fatal blow had been dealt to Paley's mode of reasoning by the Philosopher David Hume ... Hume did more; he went on to demolish the design analogy itself."

Hume's first point was that the analogy between the world or organisms in the world, and human artifacts was too weak to bear a conclusion; that if the analogy was to count the subject of the comparison must belong to the same class of objects as those of whose production by a designer we already have experience. But this, as we pointed out, draws the limits of analogical reasoning much too narrowly. There seems to be a general consensus amongst philosophers that this is so, and Hume himself appeared to acknowledge it.¹ We may conclude, then, that analogical reasoning in the design argument is permissible and survives this particular attack of Hume's upon it.

Secondly, Hume argued that to invoke intelligence as the explanation of order in the world was to show an unjustifiable partiality for reason when there were other principles, such as generation, and instinct which also were capable of producing the same effects. Here Hume was answered by Paley, who pointed out that generation is a process not a principle, and it was this very process which design was invoked in order to explain. 'Generation', if used as an explanation of the whole universe, requires redefinition, otherwise it is rendered meaningless. But in any case, to explain intelligence in terms of generation, or instinct, is to explain the higher in terms of the lower; to turn away from an account of things that is familiar and experimentally justified to one that is remote. The argument, therefore, survives Hume's second main criticism.

¹ A.E. Taylor answers this argument by saying that were our powers so limited they would be confined within very narrow limits indeed, e.g. when we discover an artifact from some ancient civilization we may not know the purpose of it, but we can infer that it was constructed for a purpose, or better if an explorer discovers on some island an object revealing contrivance we may conclude that a human being had made it, though all the other evidence of a race of people having been there may have vanished. If watches were forgotten about and lost to the human race, yet should one turn up at some future date there would be little difficulty in future archaeologists concluding that it was a product of intelligence and had a designer. Does God exist? p. 112. Cf. the argument that the comparison is not between sets of universes, as Hume supposed, but between objects demonstrating prospective contrivance.

In the third place, Hume advanced the doctrine of Strato, that if order in the material universe is explained by order in the mind of the Creator, then, in turn, that order itself requires explanation, and so on ad infinitum. This is answered in two ways; first, organization in terms of mind presents no problem, but organization in externally existing material, which manifests no properties of mind does. Therefore, to attribute the order in the world to the mind of a Creator does not involve one in an infinite regress. Secondly, the logic of the use of the word 'God' requires that we desist from further enquiry and explanation. To ask; Who made God ? is a meaningless question; so also is the question; Whence arose the plan in the mind of the Creator ?

The fourth main point of Hume's criticism was the 'Epicurean hypothesis'.

Here he was only half in earnest. If the universe is to exist at all, it will have some kind of order; it is as possible that this order that obtains has been brought about by the chance concatenation of atoms as by a designing mind. In the Epicurean hypothesis one explains non-order, and even disorder, in exactly the same way as one explains order. Any 'hypothesis' that can be used with equal effectiveness to explain both 'A' and 'not-A' can provide nothing that one would want to call an explanation of either. It is, as Kant rightly pointed out, impossible to consider the teleological phenomena we encounter in the world purely in terms of mechanism, and the 'Epicurean hypothesis' is a purely mechanistic hypothesis. Such was the state of the argument at the time when Hume advanced it.

Our survey of Hume's main criticisms of the design argument enables us to adduce the reason for the argument's survival into the nineteenth century, and even to the present time, and that is; that the philosophical arguments urged against it by Hume did not have the force that he himself intended, and were not conclusive as many of his disciples have thought them to be. If this were not the case it would be difficult to explain or understand the persistence of the argument during the first half of the nineteenth century, not only in a popular form, where ignorance of Hume's critique might excuse it, but also

amongst the foremost scientists and theologians of that period. The names associated with the Bridgewater Treatises, Chalmers, Kidd, Whewell, Bell, Roget, Buckland were not those of men who were unaware of the philosophical criticism urged, only sixty years before, against the argument they were defending and illustrating. The purely philosophical critique of the argument had none of the force that Darwinism was to have. Looking back generally upon the nineteenth century, it is possible, perhaps, to confuse these two things, and, in the light of the subsequent confusion and uncertainty into which Darwinism threw the design argument, to attribute much of this to earlier philosophical criticism.

However, the design argument survived the main thrust of Hume's critique. It is possible in principle to argue from the evidence of order that we see in the world to the mind of a Creator who may be regarded as responsible for it. The analogy will hold even if it is not perfect. It is a reasonable and experimentally justifiable inference, and even if it does not carry us as far as we might wish to go, that is, to the idea of an infinite, omnipotent and omniscient Creator who is also perfectly good - i.e. to the God of Christian orthodoxy - it takes us some way towards such a belief. The strongest point of Hume's criticism lies here, not in his attempt to disprove the validity of the analogy, but in his contention that even if it is allowed it will not take us beyond what is finite, and cannot of itself establish the existence of a perfectly good Creator. Paley recognised this. He did not regard the design argument as complete in itself. But the primary point is that if the validity of the analogy can be established then much can follow, even though its limitations are accepted.

As a contemporary philosopher has put it:

if there is a god - and the (design) argument, if it proves anything, proves the existence of a rather august deity - then the further step to the existence of God is in practice a short one, even though one might say that theoretically it is infinite. If there exists an intelligence so stupendous as to be the effective source of the whole organization and harmony of the universe, it would be overly nice to grumble that monotheism remains to be proved. 1

VII

We must now turn to consider how far, and in what form, the design argument has survived Kant's critique.

First, we notice that the important first step of the argument survives, i.e. the analogy between artifact and designer, and the world and a Creator. It is true that Kant draws attention to a difference between an artifact and an organism, but we are dealing with a case of resemblance not of identity, and they do resemble each other in that both call for a teleological explanation of their existence. An organism, though dissimilar in some respects to an artifact, cannot, any more than the latter, be considered simply in terms of mechanical causation. Mechanical causation is invariably progressive and presupposes that the effect always follows the cause. The conception of an organism requires that we invert this order, that that which for the moment we designate the effect, deserves also to be called the cause of the thing of which it is said to be the effect.

If it is claimed that the introduction of time into this conception simply serves to mystify what is otherwise straight-forward, viz. that final causes are no more than efficient causes acting a tergo;² that an effect in the future must not be understood to act upon the present, but rather a present idea of something in the future is a causal factor in what is decided or done now, it still leaves unaltered the main contention of Kant's argument which is; that we are forced back upon mind, upon thought, as the only adequate explanation of the purposive order that we discern in the universe.

1 W.I. Matson, The Existence of God, 89

2 See John Laird, Theism and Cosmology, 235

Thus, despite the dissimilarity between organism and artifact, which is freely acknowledged, the analogy holds. It not merely survives the Kantian critique, but can be said to be positively sustained by it. Although physico-teleology is incapable of determining a final end of creation

it can justify ... the conception of an intelligent world-cause as a conception which subjectively - that is, in relation to the nature of our cognitive faculty alone - is effective to explain the possibility of things that we can render intelligible to ourselves in the light of ends.¹

The fact that Kant transposes this conclusion from the objective plane, where it traditionally belonged, to the subjective does present a difficulty for the argument from design, because now we are asserting nothing about the existence and character of God, but only about our peculiar mental constitution and mode of apprehending the world. There are two possible ways of approaching this difficulty.

First, if, apart from the apprehension of the phenomenal world by means of the categories of the understanding, man is trapped in a circle of subjectivity then that subjectivity must become for him 'reality'. If, as Kant argues "... we are utterly unable to ascribe the possibility of such physical ends to any other source than an intelligent Being," and this understanding of things is "ineradicably fixed in the human race", even though it be 'subjective' it becomes the 'truth' by which man has to live, and with which he has to reckon. There is no other way of expressing, or making sense of, that part of our experience which transcends empirical reality. Such strict alsobism (as-if-ness) as this would be sufficient basis for a natural theology, which does not set out to prove or demonstrate the existence of God, but merely to point in that direction. If the constitution of the human mind is such that it must interpret organic nature teleologically, and if this interpretation leads the mind on towards belief in an intelligent Creator, then even though this belief is technically 'subjective' it nevertheless engenders an attitude of mind which is open to revelation and will serve as a powerful and authoritative confirmation of what is revealed.

1 I. Kant, Critique of Teleological Judgment, 101 & 102

Secondly, there is no reason ultimately why we must remain within the self-imposed limitations of Kant's critical philosophy. Empirical or scientific knowledge is not the only real knowledge we possess, nor even the paradigm of knowledge. This has been the fundamental mistake of the Enlightenment in which Kant himself shared and which he was particularly responsible for perpetuating. The distinction between the phenomenal and noumenal worlds ultimately breaks down. Kant would put the empirical self on the same basis of knowledge as the empirical world of nature, yet clearly a profound distinction obtains between them. As A.E. Taylor points out in his discussion of this, the self and the subjective, i.e., personality, is not something we experience as we experience objects in the natural world. I do not, e.g. experience pain, pleasure etc., from what I see around me in other people, but only from my own subjective states. Yet I do not make acquaintance with these states as objects at all, but as attitudes of a self towards objects. Thus we have a whole realm of being of a different order about which we know much.¹

Yet the two (that is, nature and subjective awareness) are not wholly closed to each other; there is interrelation between them though the one cannot become the other; e.g. a small fault on the retina can cause one to see double; also events in the physical world are influenced and acted upon by subjective desires, wishes, beliefs, etc. Thus it would appear that it is

at least conceivable without any absurdity that all physical events have conditions, which do not themselves belong to the aggregate of physical events, and that what look like the results of 'design in nature' really are results of design ...

¹ This distinction between awareness of the self and sensations, and objective knowledge of physical objects may be illustrated from three different writers. Others could be added:

J. H. Newman discusses the question of memory, experience etc., in A Grammar of Assent, and shows that he distinguishes experience of consciousness from that of objects, thus: "Our consciousness of self is prior to all questions of trust or assent." p.47.

Ludwig Wittgenstein wrote in Philosophical Investigations, "It cannot be said that I learn that I have a pain, but that 'I have a pain'. I do not know it, or observe it ... pain or sensation generally does not belong to that logical type of thing which can be witnessed or unwitnessed ... " p. 89

Richard Taylor states in Metaphysics, (1963), "The only person that can become aware of pain or any other state of mind or mental event is that person in whose mind it occurs, and his awareness of it is, of course, immediate. Even he cannot observe it in the same way that he observes any physical object, state, or change, whether in his own body or some other." p. 16.

If we find we cannot understand this relationship

the reason must lie in the insufficiency of the available evidence not in the supposed limitation of our knowledge to the establishment of relations between one part of nature and another part; this limitation is no more than a restriction on the scope of scientific knowledge and knowledge extends far beyond the bounds of science. 1

It is clear that Kant's bifurcation of reality into the phenomenal (empirical) which may be known and the noumenal which cannot be known is inadequate, and breaks down. Even within his own philosophical system there is an inconsistency which ultimately makes it untenable. It cannot, for instance, be maintained that the moral self is no part of the empirical self, for I am conscious of myself in moral experience in just the same way as I am conscious of myself in any other kind of experience. Moreover, moral experience shades into other kinds of experience by imperceptible degrees. To drive a wedge of absolute difference between moral experience and other kinds of experience, assigning them to different worlds and endowing them with different kinds of reality, is plainly incompatible with these obvious facts.

Since, therefore, we are not bound by Kant's rigid classification of what is knowable and which is unknowable we may reasonably argue that inferences from the realm of the empirical may tell us something about a reality which transcends it and lies behind the phenomena we perceive; that what looks like the results of design in nature may really be the results of design. We are not when we make such statements simply saying something about the constitution and limitations of the human mind. This discovery should not surprise us, since our belief e.g. in the existence of other minds is not the result of direct empirical evidence, by which we become assured of the existence of objects in the natural world. We have no direct apprehension of a 'soul substance', nor even of the subjective states and sensations of another person; but we understand and explain their actions by the use of teleological categories and by cumulative pragmatic verification.

1 A.E. Taylor, Does God exist?, 112 & 113

When the negative conditions of Kant's critique are overcome, the positive value of it for the design argument are considerable. Its insistence upon a teleological as well as a mechanical account of organic nature confronts us with a further dimension of reality which cannot be plumbed by physics. His conception of nature as a 'Kingdom of ends', which results from the wider application of this principle to the world as a whole, and his estimation of man, as a moral agent, as the final end and justification of such a system all serve to enhance the argument.

One of the important things which Kant did, and which helped to strengthen the argument, was to relate it to the moral nature of man. It is true that he regarded the moral proof of the existence of God as capable of a priori demonstration, and standing in need of no assistance from any other source. However, by bringing the two into conjunction and relating the notion of a theoretical teleology in nature to a moral teleology in man, he placed the design argument in its proper setting and gave it an additional strength.

It was the weakness of Hume's discussion of the argument that it was conducted on purely empiricist and intellectualist terms, and that no attention was paid to other aspects of man's nature. This was repeated in those who attacked Hume, and fairly generally in the discussion of the subject in the late eighteenth and early nineteenth centuries. A full and proper treatment of the design argument must, however, take these other sides of man's nature into account. It is something to which we shall return when we come later to the reconstruction of the argument.

BETWEEN PALEY AND DARWIN :
THE BRIDGEWATER TREATISES

I

The design argument survived the philosophical critique of the eighteenth century. But in what form did it survive, and what influence and significance did it have in the period preceding the publication of Charles Darwin's Origin of Species ?

Churchmen and theologians were content to appeal to the argument from design in their sermons and lectures, and employed it confidently in their apologetic throughout the first half of the nineteenth century. The Bridgewater Treatises are the most celebrated example of its employment during this period. The Right Honourable and Reverend Francis Henry, Earl of Bridgewater, who died in 1829, left the sum of £8,000 to be held at the disposal of the President of the Royal Society, who should appoint certain persons of his choosing to write and publish one thousand copies of a work, "On the Power, Wisdom, and Goodness of God, as manifested in Creation; illustrating such work by all reasonable arguments, as, for instance, the variety and formation of God's creatures in the animal, vegetable and mineral Kingdoms; the effect of digestion, and thereby conversion; the construction of the hand of man, and an infinite variety of other arguments; as also by discoveries ancient and modern, in arts, sciences, and the whole extent of literature".

The President of the Royal Society, Davies Gilbert, Esq, requested the assistance of the Archbishop of Canterbury and the Bishop of London in undertaking this task and, acting with their advice, he appointed the following eight men to write separate treatises as stated below:

- (1) The Rev. Thomas Chalmers, D.D., Professor of Divinity in the University of Edinburgh, "On the Power, Wisdom and Goodness of God and manifested in the Adaptation of External Nature to the Moral and Intellectual Constitution of Man";

- (2) John Kidd, M.D., F.R.S., Regius Professor of Medicine in the University of Oxford, "On the Adaptation of External Nature to the Physical Condition of Man";
- (3) The Rev. William Whewell, M.A., F.R.S., Fellow of Trinity College, Cambridge, "Astronomy and General Physics Considered with Reference to Natural Theology";
- (4) Sir Charles Bell, K.G.H., F.R.S., L & E. "The Hand: Its Mechanism and Vital Endowments as Evincing Design";
- (5) Peter Mark Roget, M.D., Fellow of, and Secretary to, the Royal Society, "On Animal and Vegetable Physiology";
- (6) The Rev. William Buckland, D.D., F.R.S., Canon of Christ Church, and Professor of Geology in the University of Oxford, "On Geology and Mineralogy";
- (7) The Rev. William Kirby, M.A., F.R.S. "On the History, Habits and Instincts of Animals";
- (8) William Prout, M.D., F.R.S., "Chemistry, Meteorology and the Function of Digestion, Considered with Reference to Natural Theology".

The more important and better known of these treatises are those by Chalmers, Whewell and Buckland.

Thomas Chalmers, born in 1780 at Anstruther in Fifeshire and educated at the University of St. Andrews, was the foremost Scottish Divine of his time. Through reading Wilberforce's Practical View he became a pronounced Evangelical preacher.¹ His treatise is the most doctrinal and philosophical of the eight. The specialists in the different branches of science who, on the whole, predominated tended to concentrate more upon instances rather than arguments; John Kidd, who wrote 'The Adaptation of External Nature to the Physical Condition of Man', declared plainly in the preface that he would only unfold a train of facts to illustrate his thesis, but could not attempt any argument.

1 J. Hunt, Religious thought in the nineteenth century, 367

We shall, in view of its importance, consider Chalmers' treatise first. His subject is the adaptation of external nature to the moral and intellectual condition of man, and he makes it clear at the outset that he is not going to regard external nature as simply the material universe, which would impoverish the argument, but as being the material universe plus the moral, intellectual and social milieu in which man finds himself.

While adaptations in the material universe give evidence of the natural attributes of God, those of the mental and moral nature of man are best fitted to give proof of God's moral attributes. That the sight of distress should be followed by compassion is an obvious provision of benevolence. Then there is the supremacy of conscience, which is a felt supremacy in everyone. Conscience stands as the regulator of all the other parts of man's moral nature, as Bishop Butler has pointed out. From this supremacy of conscience we may infer the righteous character of God, for would an unrighteous Being have endowed man with so distinct a voice on the side of righteousness ? ¹

Alongside the remorse of conscience there is a physical state of disquiet and bitterness and a sweetness and relish accompanies virtue. Just as God has created a sense of hunger, and also the sweetness and palatableness of food to go together, so these two moral states increase the argument for an intelligent author of man's nature. To strengthen this argument further Chalmers appeals to the power and formation of habits, which serve to strengthen either virtue or vice in the individual, and lead finally to a state of blessedness or torment, which is inherent in the nature of the virtue or the vice which dominates the individual's life. This also points to the righteous character of God.

Society serves to add a new dimension to what has already been shown to be the case with the individual. It magnifies the happiness of benevolence and the wretchedness of wickedness; therefore man's moral nature is adapted to society.

¹ T. Chalmers, Bridgewater Treatises, 1, 85

Insomuch, that we have only to imagine a reign of perfect virtue; and then, in spite of the physical ills which essentially and inevitably attach to our condition, we should feel as if we had approximated very nearly to a state of perfect enjoyment among men - or, in other words, that the bliss of paradise would be almost fully realized upon earth, were but the moral graces and charities of paradise firmly established there, and in full operation. 1

Therefore, "for any aggregate of human beings to be right physically and right economically, it is the indispensable, while at the same time the all effectual condition, that they should be right morally." 2

We see further remarkable adaptations of man's mental constitution to the physical needs of society in anger which restrains violence - sometimes a mere glance is sufficient - and shame which restrains licentiousness between the sexes. 3 Man's moral constitution exists prior to his own wisdom and his own will. For things to be so managed would have required far greater wisdom and understanding than we possess. 4 There are certain inherent principles and dispositions which make social and political institutions possible - the bonds of affection in the family, of patriotism in the nation, and the natural feeling of respect for rank. Those who would break down these ties have nothing to replace them with, though they often enlarge upon the virtues of cosmopolitanism or internationalism. Where these schemes fail they reveal the wisdom of nature's God who devised other means of binding people together.

The natural sense of property, too, has a definite role and function in society and the economic well-being of the nation and mankind. It is best for governments to work along with, rather than against, these natural tendencies and feelings. 5 The sense of property exists before the sense of justice in our personal development. The latter regulates it, but does not create it; it is my sensitivity to my own body, its pain, etc., which makes me respect that of others, and it is the same with property. Thus we have the 'golden rule',

1 T. Chalmers, Bridgewater Treatises, 183

2 Ibid., 187-8

3 Ibid., 220

4 Ibid., 224

5 Ibid., 256

and also the maxim, that we are to love others as we do ourselves. Without the love of self, and the appreciation of property rights, it would be impossible to love others, or respect their possessions. Justice simply acts upon an original affection. 'Property is theft' is, therefore, subversive not only of society, but of man's nature. ¹

The tendency, specially with the fashion of 'social contract' theories, is to regard all these arrangements as stemming from the forethought and prospective contrivance of man; whereas, in truth, we must attribute them to the disposition of nature, or rather nature's God. ²

Chalmers invokes the harmony of free-trade and its resultant beneficial effects for the community as a whole by each one pursuing his own labour for his own reward, as an indication of how 'the Supreme Agent' has ordered man's motives for the good of society. We cannot attribute this to the organization of human foresight and superintendence. ³

When we behold the working of a complex inanimate machine and the usefulness of its products - we infer, from the unconsciousness of all its parts, that there must be a planning and presiding wisdom in the construction of it. The conclusion is not the less obvious, we think it emphatically more so, when, instead of this, we behold in one of the animate machines of human society, the busy world of trade, a beneficent result, an optimism of public and economical advantage, wrought out by the free movements of vast multitudes of men, not one of whom had the advantage of the public in all his thoughts. ⁴

Evidence of the divine superintendence of the mechanism of trade is seen in the fact that wherever sobriety and virtue prevail a healthy impulse is given to all its movements, which reveals an inseparable connection between the moral worth and economic prosperity of a people. Thus if the working classes were thrifty they would be proof against the periods of recession of trade; if they saved when wages were high, they would have something for the rainy day. ⁵

1 T. Chalmers, Bridgewater Treatises, 277

2 Ibid., 279

3 Ibid., 40

4 Ibid., 41

5 Ibid., 52

Their economic is sure to follow by successive advances in the career of their moral elevation; nor do we hold it impossible or even unlikely - that gaining, every generation, on the distance which now separates them from the upper classes of society, they shall, in respect both of decent sufficiency and dignified leisure, make perpetual approximations to the fellowships and enjoyments of cultivated life. 1.

We see in the way in which individual and social prosperity are interrelated with truthfulness and morality an indication that such could not have been established as a spring of society by a malevolent Being. Yet all this stems from the concern of the individual with himself, rather than from his desire to further the moral purpose of society, and so points to an overall plan and design by God for the good of society.

Soon after Chalmers Karl Marx was to propose a dialectical view of society as a living developing organism which owed its structure and appearance of design to the basic economic forces which determined and guided its formation, the division of labour and the emergence of classes all being brought about in this way. As Darwin later invoked natural selection to account for the appearance of design in the biological organism so Marx argued that there was no need to believe in a mind controlling the whole process of history, but that its order was attributable to the laws and forces of economic development.

Marx's theory had the merit of drawing attention to what had been neglected, to the powerful influence of economic activity upon the whole of society, but it cannot be regarded as an exhaustive explanation of human behaviour or the ordering of society. The economic motive itself is not a simple motive and when we go behind it we find all sorts of complex ideas which are not reducible to a simple economic motive. If we consider history we find that there are many different motives, e.g., religious, national and lately economic, but we cannot say that one is more dominant than the others all the time. The complexity of human nature and society defies the reductionist theory of Marx.

1 T. Chalmers, Bridgewater Treatises, 56

Ideas influence events as much as events influence ideas. Chalmers could therefore appeal to the remarkable interaction of religious, moral and economic ideas and motives in the ordering and harmony of society.

Finally, Chalmers turns to the intellectual constitution of man and its adaptation to the external world. This must continue to be a source of wonder as we reflect upon it. Association of ideas may account for one idea being followed by another idea, but not one event being followed by another event. He argues that expectation of such succession is there before experience of it:

The child who strikes the table with a spoon for the first time, and is regaled with the noise, will strike it again with as confident an expectation of the same result, as if the succession had been familiar to it for years. There is the expectation before the experience of Nature's constancy; and still the topic of our wonder and gratitude is, that this instinctive and universal faith in the heart, should be responded to by objective nature, in one wide and universal fulfilment. ¹

We have an instinctive certainty of the invariableness of nature from the beginning - a constitutional bias coeval with the earliest dawn of the understanding.

This intuition of the mind serves to underline and establish other intuitions and their objective reality; intuitions which some would regard as merely arbitrary, but which because of this regularity can be regarded as having objective reality. The conformity of man's intellectual nature with external nature is the refutation of scepticism. ²

The correspondence between nature and the processes of the mind i.e. that from premises which rest upon observation, conclusions can be drawn which can be found by experiment to be confirmed by further observation, can only be regarded as an exquisite adaptation between the subjective and objective, between the mental and material systems.

¹ T. Chalmers, Bridgewater Treatises, 142

² Ibid., 153

In his concluding chapter on 'The Defects and Uses of Natural Theology' Chalmers argues that atheism assumes its stance, not upon the proposition that there is no God, for that would require evidence that God does not exist, and such evidence is not forthcoming, but upon the ground that the case for the existence of God is not proven. Atheism is, therefore, a condition of ignorance rather than knowledge. But, while there is a clear intellectual principle preventing the atheist proceeding in the direction of anti-theism there is another moral principle, which should compel him to entertain the question of the existence of God. The man who is ignorant of his benefactor should at least desire to know something about him. Thus, there is an ethical consideration prior to the pursuit of religion or theology.

It may be made to appear that there is an ethic connected with theology, which may come into play, anterior to a clear view of any of its objects. More especially we do not need to be sure of God, ere we ought to have certain feelings, or at least certain aspirations towards him. For this purpose we do not need, fully and absolutely, to believe that God is. It is enough that our minds cannot fully and absolutely acquiesce in the position that God is not. 1

Man, therefore, is morally obliged to go in search of "that unseen benefactor, who, for ought I know, has ushered me into existence, and spread so glorious a panorama around me."² And there are many things lying on the surface of life which should at least give rise to certain presumptions in favour of a God. The curious workmanship of our frame may have a designer. The extraordinary conjunction of senses and external nature may have been produced by a Creator.³

"The prima facie evidence for a God may not be enough to decide the question; but it should at least decide man to entertain the question"⁴ Man is not to blame, if an atheist because of want of proof. But he is to blame, if an atheist because he has shut his eyes"⁵ To reject God when he is known, and to remain content that he should be unknown, incur the same moral condemnation. If once this prior moral obligation which rests upon man, to go in quest of God, is recognised and acted upon, the evidence that is available in the design of the world is given its proper context, and acquires greater force than if it is viewed simply in a cold, detached and objective fashion. Anyway, such a position

1 T. Chalmers, Bridgewater Treatises, 267 2 Ibid., 3 Ibid., 268 & 269

4 Ibid., 270 5 Ibid., 272

is not open to man as a moral being and is a mere abstraction.

Natural theology, then, is the response to the quest for God, it is also itself a part of that quest. It may not be able to answer all the questions that it raises, but even if it could it does not dispense with that other, supernatural, theology which is founded upon the Christian revelation, for the reason that while natural theology may tell us of God, it does not solve the problem of man's relation with that God. Natural theology speaks of conscience and law and human disobedience, but it has no word of reconciliation. 1

The value of Natural Theology lies in the fact that it raises questions and creates an interest which can only be satisfied by a supernatural theology. The two branches of theology are like a mould and its counterpart. Natural theology prompts enquiry or, if this is absent, condemns the lack of it. "This we hold to be the precise office of natural theology". It has been called the basis of Christianity. This is a mistake. Christianity rests upon its own proper evidence. Natural theology is not the foundation of the edifice, "but the taper by which we grope our way to the edifice". If, instead of this, Christianity be made to depend upon natural theology in the same way as mathematical doctrines rest upon the axioms of the science, she becomes "weak throughout, because weak radically".² "It is not that natural religion is the premises and Christianity the conclusion; but it is that natural religion creates an appetite which it cannot quell; and he who is urged thereby, seeks for a rest and satisfaction which he can only obtain in the fulness of the Gospel."³

We have spent some time on Chalmers' contribution to the Bridgewater Treatises, because it gives us a view of how things stood at the beginning of the nineteenth century. The design argument was in good repute, and was strongly defended. But Chalmers' exposition of it is not a mere reiteration of Paley's;

1 T. Chalmers, Bridgewater Treatises, 284

2 Ibid., 290

3 Ibid.

he carries the argument into other fields. He applies it to the moral and intellectual constitution of man, and even to man in his economic and political arrangements. The principle is the same throughout as that of Paley's natural theology, that is, that the arrangement of the parts in the whole is evidence of intelligent forethought and purposive contrivance. This, in Chalmers' view, is as true of the moral, intellectual and social organization of human beings as it is of the physical organisms which Paley studied and which he made the ground of his argument. Chalmers does this with remarkable clarity, occasionally revealing deep insights into the constitution of human nature and society, such as his view of the relationship of individuals to property, and the correspondence of the mind to external reality. He thus makes, what was generally regarded as the most difficult of the subjects assigned to the writers of the treatises, an occasion for extending the scope of the design argument in a systematic way that had not previously been attempted.

The note with which he concludes, on the uses of natural theology, is also of importance. He distinguishes clearly between this and supernatural theology, as he calls it; and also introduces a moral dimension into the argument which was largely absent from the debate during the eighteenth century. We have already drawn attention to this in our discussion of Hume and Kant. It must be clear that if the design argument is to be given its true force, and allowed to rise to its proper height, it cannot be viewed simply in intellectualist terms; it must be related to man in the wholeness of his nature, and as a moral agent. The merit of Chalmers' use of the argument is, that he does this, and relates the intellect to the will. As we can only see certain physical objects properly if we bring our concentration to bear upon them, so the significance of the evidence of design is only properly evaluated by the mind when there is an effort of the will preceding and accompanying it. Thus it is the moral state determines the intellectual. The two are integrally related and can only be separated by arbitrary abstraction. To overlook or forget this throws the argument from design into a false setting, and displays it in an unfavourable light.

II

The nearest approach to Chalmers, for sustained reasoning and original employment of the design argument, is made, in this series of treatises, by William Whewell. Whewell had risen from humble origins (being a son of a carpenter in Lancaster, and intended originally himself for the same trade), to become Master of Trinity College, Cambridge, and successively Professor of Mineralogy and Moral Philosophy. The subject assigned him for his treatise was 'Astronomy and General Physics considered with special reference to Natural Theology'.

He sees it as the task of science to revise from time to time natural, or physico-theology, in order to keep it up to date and correct it. Natural theology is not a perfect system, but is not to be despised for that reason. Our knowledge of nature is really our knowledge of its laws. It is a collection of facts governed by laws. If a man were lost in a strange country he would soon be able to determine whether or not it were governed by laws, and if these laws were beneficial to its inhabitants.¹ Therefore, in the multiplicity of laws governing the world of nature and their complexity and interaction, we are able likewise to gather some impression "of adaptation, of mutual fitness, of preparation and completion of purpose and provision. This impression is suggested by the contemplation of every part of nature". However, the impression is something which is built up cumulatively. It cannot be conveyed in a few words; it calls for many examples and illustrations, and also for a serious and reflective mind. Here again we hear the moral note sounded, which was present in Chalmers' treatment. We cannot expect the conviction to which the design argument leads to be arrived at "by a few steps of reasoning, like the conclusion of a geometrical proposition, or the results of an arithmetical calculation".² In this, Whewell has touched upon something that is of great importance to a proper understanding of the design argument. The very word 'argument' can, perhaps, be misleading, in the sense that he describes, so that it is assumed that the substance of it can be put in the form of a syllogism.

1 W. Whewell, Bridgewater Treatise, 5

2 Ibid., 13

But as Paley has pointed out, the 'argument' is essentially 'impressionistic', that is, by the citing of examples and illustrations an impression is made upon the mind. Even Hume, through the person of Cleanthes, acknowledges this to be the case. It is not, therefore, a question of premises and conclusions, but of instances and intuition. ^

The central part of Whewell's treatise is taken up with illustrations of his thesis drawn from astronomy and physics, such as the length of the year and the periodicity of plants and the arrangement of their internal mechanism to coincide with it. If it is argued, he says, that only such plants as are suited to this have survived, then it still does not explain the existence of the mechanism. "How came the function of the plants to be periodical at all?" Here he develops a general argument, which we have met with before in Paley and also in Kant, and that is, that if organic life must be regarded as deriving from other organic beings, then to explain the existence of present forms by derivation from earlier ones, even if they are of a different species, does not get rid of the question of design, but merely takes it one stage back. "Any supposition", he states, "that the universe has gradually approximated to that state of harmony among the operations of its different parts ... would make it necessary for the objector to assume a previous state of things preparatory to this perfect correspondence. And in this preparatory condition we should still be able to trace the rudiments of that harmony, for which it is proposed to account, so that even the most unbounded licence of hypothesis would not enable the opponent to obliterate the traces of an intentional adaptation of one part of nature to another".¹

Whewell adduces many examples generally of the laws governing inorganic nature - the atmosphere, light, heat, water, which may be regarded, in view of their adaptation to the needs of organic nature, as being indicative of "the most refined, far-seeing and far ruling contrivance". One example which still impresses contemporary physicists may suffice: water expands and becomes lighter by heat, and by reason of this law, the water in the lower parts of our lakes and seas is cooler than that near the surface.

¹ W. Whewell, Bridgewater Treatise, 30 & 31

If this law operated without exception it would result, with the continued progress of cold, in the formation of ice in the bottoms of lakes and seas. Thus we would have a bed of ice increasing with every occasion until the whole was frozen, and the sun in summer would do no more than melt a small area of the surface. But in fact we find this law modified just at the point where its continued regularity would be destructive both of water and life which is dependent upon it. "Water contracts by the increase of cold, till we come near the freezing temperature; but then by a further increase of cold, it contracts no more, but expands till the point at which it becomes ice".¹ This peculiarity of the laws regulating water thus ensures an environment in which life is possible. But why this should be so with regard to the molecules of water, when it is not the case with any other fluid, is just one of those ultimate facts to which no explanation can be given, other than to say that this is the way the world is ordered.

Whewell relates the physical creation and its maintenance by God to his moral governorship of the world; the physico-theological argument is not enough on its own.² What we see is the convergence of the physical creation and the moral purpose of life.

With the material world we cannot stop. If a superior Intelligence have ordered and adjusted the succession of the seasons and the structure of the plants of the field, we must allow for more than this at the first sight would seem to imply. We must admit still greater powers, still higher wisdom for the beasts of the forest with their faculties; and higher wisdom still and more transcendent attributes for the creation of man. And when we reach this point, we find that it is not knowledge only, not power only, not foresight and beneficence alone, which we must attribute to the Maker of the world; but that we must consider him as the Author, in us, of a reverence for moral purity and rectitude, and if the author of such emotions in us, how can we conceive of Him otherwise, than that these qualities are parts of His nature; and that He is not only wise and great, and good, incomparably beyond our highest conceptions, but also conformed in his purposes to the rule which he thus imposes upon us, that is, Holy in the highest degree which we can imagine to ourselves as possible. 3

1 W. Whewell, Bridgewater Treatise, 84

2 Ibid., 253

3 Ibid., 267 & 268

Finally, Whewell argues that order implies intelligence, because the conception of law is dependent upon mind.

What we call a general law is, in truth, a form of expression including a number of facts of like kind. The facts are separate; the unity of view by which we associate them, the character of generality and of law, resides in those relations which are the object of the intellect. The law, once apprehended by us, takes in our minds the place of the facts themselves, and is said to govern and determine them, because it determines our anticipations of which they will be. But we cannot, it would seem, conceive a law, founded on such intelligible relations, to govern and determine the facts themselves, any otherwise than by supposing also an intelligence by which those relations are contemplated, and these consequences realized. We cannot, then, represent to ourselves the universe governed by general laws, otherwise than by conceiving an intelligent and conscious Deity, by whom the laws were originally contemplated, established and applied. 1

In short, as it requires mind to comprehend law and order in the universe, which is something that transcends the facts themselves, so it requires mind to originate those laws in the first place.

He reinforces this argument in an ingenious way, by an appeal to the psychology of the experience of discovering the laws of nature. It is akin, he says, to the experience of discovering the meaning of an unknown language. For a long time the letters or characters mean nothing. They appear to be arbitrary marks, disjointed and meaningless. Then some clue to their arrangement flashes upon the mind and the line of letters appears to take on definite shape and significance. Out of an apparently meaningless jumble of symbols there emerges an ordered and intelligible communication. Here we have mind discovering mind. The step of discovering the laws of nature so much resembles this "that we cannot be surprised if those persons, in whose minds such a process has taken place, have been most ready to acknowledge the existence and operation of a superintending intelligence, whose ordinances it was their employment to study". Kepler's outburst of praise and thanksgiving to God on understanding the solar system is, in the light of this, seen to be a proper and fitting response of mind to Mind, of communication of intelligence with Intelligence, revealed and discovered in the 'language' of the order and laws of nature.

1 W. Whewell, Bridgewater Treatise, 300 & 301

We may here recall Paley's point, that it belongs to God's omnipotence to have made all things, if he had so chosen, without design or contrivance, "but it is in the choice and adaptation of means, that a creative intelligence is seen".

Whewell compares the difference, in its effect upon the mind, of discovering laws of nature inductively, and deductively working out their consequences. He is not surprised that those engaged in the latter branch of science are often less conscious of a Creator than the former. An intuition is needed by the discoverer to grasp the order and relate it to some model of thought. Even if the models are variable, yet they do refer to some objective order of phenomena.

If it is urged against this argument, as Hume would have argued, that it requires a regular conjunction of law and mind in our experience for us to be able to arrive at the conclusion that law implies mind, Whewell replies, How do we know there is design even in human actions? How do we know there are other minds? Not because we have compared several causes and effects, because that is impossible: we only have acquaintance with our own minds; but because we conclude from this, and the words and actions of other people, that they are acting rationally, according to a purpose.

This is not the result of reasoning: we do not infer this from any similar case which we have known; since we are now speaking of the first conception of a will and purpose different from our own. In arriving at such knowledge we are aided only by our own consciousness of what thought, purpose, will, are: and possessing this regulative principle, we so decypher and interpret the complex appearances which surround us, that we receive irresistibly the persuasion of the existence of other men, with thought and will and purpose like our own. And just in the same manner, when we examine attentively the adjustments of the parts of the human frame to each other and the elements, the relation and properties of the earth to those of its inhabitants, or of the physical and moral nature of man, the thought must arise and cling to our perceptions, however little it might be encouraged, that this system, everywhere so full of wonderful combinations, suited to the preservation and the well-being of living creatures, is also the expression of the intention, wisdom and goodness of a personal creator and governor. 1

1 W. Whewell, Bridgewater Treatise, 345 & 346

Tennant employs a similar line of reasoning in his reconstruction of the design argument, but does not acknowledge its derivation from Whewell. He who denies the intuition of mind and intelligence to the order he sees in nature, must likewise deny it to the evidence of purposive behaviour he sees in human action: ergo, the atheist must also be a solipsist.

Whewell points out how difficult it is for the atheist to avoid language which has a teleological significance, when speaking about nature. He shows how Laplace could not avoid using such expressions, and says, if 'God' is substituted for 'Nature' in his discourse, then we have an account of things which is acceptable to the theist.

III

The task which William Buckland undertook was to show that Paley's argument from design had not been materially affected by the new discoveries in Geology. Buckland, a Canon of Christchurch, was the first Professor of Geology in the University of Oxford, and an international figure in this young science. His views on the subject might, therefore, be taken as fairly representative of the prevailing orthodox opinion, if not of churchmen, then of geologists at that time. Charles Lyell had published his first edition of The Principles of Geology in 1830, an epoch-making book, in which he advocated uniformitarianism in uncompromising terms. But this theory had not at that time gained any real acceptance, and it was some time before it succeeded in overthrowing the catastrophism to which Buckland held, and which had the seal of authority set upon it by Baron Cuvier.

Paley had dealt, in his natural theology, with existing species of animals and plants, showing how they were adapted to particular ends, and so demonstrating that there was design in their production. Now, however, geology and palaeontology brought to light a whole vista of ancient worlds, unknown to previous generations, with their strange and wonderful varieties of extinct plants and animals. How did the design argument stand now in the light of

these new discoveries? Buckland's contention in his treatise was that far from creating adverse conditions for it, the discoveries of modern geology enhanced the argument. His grounds for this were threefold.

First, we see in nature the universal reign of law. However far back we go we find that the material substances from which the earth is made are subject to the same laws that prevail now. To this extent Buckland was a uniformitarian himself. Religion has nothing to fear from geology, he asserts, any more than from astronomy. While geology has already proved that the world has passed through successive stages, and has not remained in its present form from all eternity, yet

the ultimate atoms of the material elements, through whatever changes they may have passed, are, and ever have been, governed by laws, as regular and uniform, as those which hold the planets in their courses. 1

In the "uniformity of the laws of matter and motion", which have in all ages regulated the mechanical and chemical forces, Buckland sees "ultimate proofs of method and design." 2

In his penultimate chapter on "Proofs of Design in the Structure and Composition of Unorganized Mineral Bodies", he refers again to this point. The laws governing the formation of the molecules of substances are "severely rigid", and the combinations and figures produced by them, far from indicating the fortuitous result of accident, are "in proportions mathematically exact". The atheistical theory advocated by Hume under the name of the Epicurean hypothesis, which assumes the eternity of matter and motion, and argues that all matter must of necessity have assumed some form, "and therefore, may fortuitously have settled into any of those under which it actually appears", is overthrown by the facts. For upon this supposition "we ought to find all kinds of substances presented occasionally under an infinite number of external forms, and combined in endless varieties of indefinite proportions;

1 William Buckland, Bridgewater Treatise, 11

2 Ibid., 49

but observation has shewn that crystalline mineral bodies occur under a fixed and limited number of external forms called secondary, and that these are constructed in a series of more simple primary forms, which are demonstrable by cleavage and mechanical division without any chemical analysis; the integrant molecules of these primary forms ... are made up of ... molecules of the first substances obtained by chemical analysis" ¹

The result of thus tracing back all mineral substances to their original condition is the discovery that they are regulated in their composition by fixed and universal laws, both mechanical and chemical, and these laws reveal such "subserviency of means to ends, so much harmony, and order, and methodical arrangement," that we can find no reasonable explanation of it without invoking "the Will and Power of a Supreme Creator." ²

Buckland's, first point then, is that though geology extends our conception of the world and the changes that have taken place in it, we find in the universal and unchanging sway of physical laws a proof of design.

Secondly, he contends that geology assists the design argument because it furnishes a proof of the beginning of the organic world. One way, as old as Aristotle, of evading the conclusions of the design argument has been to assert that the world and its forms are eternal. He sums up this point in the words of his Inaugural Lecture given at Oxford some thirteen years before, in 1820.

The consideration of the evidence afforded by geological phenomena may enable us to lay more securely the very foundation of natural theology, inasmuch as they clearly point out to us a period antecedent to the habitable state of the earth, and consequently antecedent to its inhabitants. When our minds become thus familiarized with the idea of a beginning and first creation of the beings we now see around us, the proofs of design, which the structure of those beings affords, carry with them a more forcible conviction of an intelligent Creator, and the hypothesis of an eternal succession of causes is thus at once removed. We argue thus: it is demonstrable from geology that there was a period when no organic beings had existence; these organic beings must therefore have had a beginning subsequently to this period; and where is that beginning to be found but in the will and fiat of an intelligent and all-wise Creator? ³

1 William Buckland, Bridgewater Treatise, 576

2 Ibid., 578

3 William Buckland, Inaugural Lecture before the University of Oxford (1820)

Buckland's third point was that geology poses no threat to the argument from design, since it discovers the same evidence of prospective contrivance in organic nature in the fossils it unearths, and therefore confirms the argument. Such contrivance, wherever it is found, must be attributed to an intelligent Creator. Paley's argument and illustrations embraced only existing species. He knew little or nothing of megatheria, plesiosaurs, and the multitudes of extinct plants and animals which formerly inhabited the world. However if the same purposive organization can be demonstrated in the case of extinct species of animals, etc., as existing ones the argument remains unaltered. Buckland undertakes to do this in considerable detail, and the greater part of the Treatise is taken up with this demonstration. "I know not"; he says, "how I can better fulfil the object of this Treatise than by attempting to show that the extinct species of Animals and Vegetables which have in former Periods occupied our Planet afford, in their fossil remains, the same evidences of contrivance and design that have been shown by Ray, Derham and Paley, to pervade the structure of existing Genera and Species of organized Beings".¹

Buckland makes no original contribution to the theory of the design argument. He merely accepts the position outlined by Paley in the last century, and adapts it to the needs of his subject, showing how the new discoveries in geology do not materially affect the argument, but may be used as further illustrations of the teleological principle.

V

It is worth noticing briefly one other treatise, that of Sir Charles Bell, Professor of Surgery in the University of Edinburgh, who was given the subject of 'The Hand: Its Mechanism and Vital Endowments as Evincing Design'. The important point that Bell made is one that had recently arisen from the study of comparative anatomy, and, in particular, from the researches of Baron Cuvier.

¹ William Buckland, Bridgewater Treatise, 107

Cuvier had demonstrated that from the discovery of a single bone, it was possible to reconstruct in theory the whole animal, not merely its size, but the form and joints of its skeleton, the structure of its jaws and teeth, the nature of its food and digestive system.¹ This, at the time, was regarded as no less than a miracle of science. But it revealed something more, which was that the hand or, for that matter, the other limbs and organs of a particular animal, were not mere appendages, but were integrally related to the whole system of the body. Lamarck had assumed that it was possible for an animal to develop and sprout new limbs and organs in response either to internal desire or to outward circumstances. Bell pronounced such a theory absurd, since any organ or limb, must presuppose the whole arrangement of the frame and body to accommodate it.

Changes, Bell acknowledged, we do observe in the conformation of animals; there are the changes in the human foetus during gestation; the change which takes place at birth to meet new conditions; but in all this development the changes follow a predetermined pattern and anticipate future conditions which the organism will meet. The same is true of the metamorphosis of larvae into winged insects. "Here is no budding and stretching of the organs, under the influence of the surrounding demands; but a change operated on all the economy, and prospective, that is, in reference to a condition which the creature has not yet attained."² There are also the revolutions that take place in all living things during the period of their existence. What is so remarkable about this, is, again, the way in which it is all predetermined. The life and development of the plant or animal unfolds according to a particular plan which is inherent in the organism itself. Not only is it determined how it shall attract matter and build up the complex structure of an animal body; but even the period of the existence of the animal is from its beginning defined.³ During all the changes of life, the material of the body is ever new. The poet's description of the aged body as a ruin is a misconception. The body is ever decaying and ever renewing itself. "The difference of the activity with which this change

1 Charles Bell, Bridgewater Treatise, 90

2 Ibid., 179

3 Ibid., 182

in the material of the body is wrought, compared with that of a child, may be as a week to a day; but here is not the cause of the grey hairs, the faded cheek, and the feeble step. This is the stamp which the Creator has intended should be deciphered and interpreted." ¹

Bell, of course, knew nothing of the 'DNA Code' which is now a matter of common knowledge and helps to explain the mystery of growth and development in living bodies, but in its absence he had to invent and posit something similar, which would account for the ordered and measured progress and development of organisms. Therefore, instead of a 'code' he spoke of a 'stamp' impressed upon living things to be 'deciphered' and 'interpreted' as the life unfolds. The organism is not a mere aggregate of parts, to which, or from which, bits may be added or removed at will.

The possession of an instrument like the hand, implies that there must be a great part of the organization, which strictly belongs to it, concealed. The hand is not a thing appended, or put on, to the body, like an additional movement in a watch; but a thousand intricate relations must be established throughout the whole frame in connection with it; not only must appropriate nerves of motion and nerves of sensation be supplied, and an original part in the composition of the brain, which shall have relation to them; but even with all this super-added organization, the hand would lie inactive, unless a propensity were created to put it into operation. ²

VI

The Bridgewater Treatises show that the argument from design and the Paleyan type of natural theology still held its place, and played a dominant role in the theological and scientific thought of the 1830s. The men chosen for the production of the treatises were leaders of thought in their particular fields, and fully representative of the learning of the age. We may also judge the temper of the times from the reviews of the Bridgewater Treatises in the leading journals.

¹ Charles Bell, Bridgewater Treatises, 183

² Ibid., 254

The Monthly Review for July 1833 carried a review of Chalmers' Treatise on the adaptation of external nature to the moral and intellectual constitution of man. The reviewer was of the opinion that Chalmers evaded the task assigned him, since he approached the subject from the point of view of what was external to the individual mind, and not what was external to the mind as such. He thought, too, that arguments about the air and its adaptation to the power of speech (which Chalmers did refer to) afford better examples of the adaptation of external nature to man's intellectual powers than the moral arguments that Chalmers employed. But the criticism is not radical. The principle of adaptation and the notion of design are not questioned. It is only a matter of how this may most effectively be illustrated and developed.

Whewell's Bridgewater Treatise was reviewed in 1833 in the August issue of the Monthly Review. No adverse criticisms were made of this work. The reviewer spoke of the "excellent arrangement and completeness of execution".¹

Buckland's treatise on geology and mineralogy appeared much later than the others, being delayed by the difficulty of producing the coloured plates which illustrated it. The Edinburgh Review of 1837 carried an article on it. The reviewer welcomed the rejection of 'Flood geology' by Buckland, which Buckland had formerly held, and is amazed to think that "... it was until recently taught in universities and accepted by men of sound mind". He himself accepted the Huttonian theory of gradual change effected over long periods of time by ordinary natural forces such as we now witness in operation. These views had been objected to on religious grounds, but on the contrary, such "good and exciting views of the alternate decay and renovation of the earth's surface, in place of being opposed to any religious principle, or employed to support any sceptical

¹ Monthly Review (1833), 561

opinions, were increasingly urged by their author (Hutton) as the strongest evidences of benevolent design ... " ¹

The reviewer was anxious to point out that acceptance of the Huttonian notion of gradualism, which was coming about as the result of Lyell's publication of The Principles of Geology in 1830, in no way compromised the understanding of design in creation, but served to enhance it. For just as Newton had shown the motion of the heavens to be subject to laws, which he attributed to the Creator, so Hutton ascribed the ordered revolutions of the earth to those laws governing matter, which had been established by the Creator at the beginning.

The abandonment, therefore, by Buckland of the Mosaic deluge as the cause of fossiliferous strata did not imply a conflict between the scientific views he now held and the argument from design in creation, for he "proceeds to point out the evidences of design in the inorganic structures of the globe, and in the fossil remains which these strata contain". ² Gradual change in geology effected by natural forces did not at this stage carry with it the corollary of gradual change by the agency of natural causes in the organic sphere. Immutability of species was thought perfectly compatible with the new uniformitarian geology. Hence the argument from design was not felt to be threatened by this profound change in the approach to geological science, which was taking place in the 1830s at the time that Buckland wrote. Thus we find even here the reviewer upholding the general principle behind Paley's natural theology. ³

¹ Edinburgh Review, (1837), 7. Uniformitarian ideas in geology were favoured by Hutton and others because they were considered to be more in harmony with the concept of an ordered universe and design, than those of the catastrophist school, and indeed those who entertained the Biblical teaching of the Flood. The dominance of natural theology and the argument from design at this period therefore contributed to the rise of the new geology of Lyell and was not absent from Darwin's thinking when he in turn sought to supplant creationism with 'biological uniformitarianism'.

² Ibid., 14

³ Ibid., 27

The Edinburgh Review of 1834 contained a review of William Whewell's treatise on astronomy and general physics, in which the principal criticism appeared to be that Whewell did not regard natural theology as a perfect system. In the opinion of the reviewer it was "one of unimpeachable proofs".¹

Natural theology, and in particular the argument from design, still enjoyed general acceptance at all levels of thought in the second quarter of the nineteenth century and played an important role in Christian apologetic. The Bridgewater Treatises were written in a climate of opinion that was disposed to concur in their general thesis, while individuals might engage in minor criticisms, or adopt different methods of deploying the arguments.

1 Edinburgh Review (1834), 427

BETWEEN PALEY AND DARWIN:
THE COPERNICAN REVOLUTION.

Paley's Natural Theology was based upon the assumption that species were immutable and had a real existence in nature, i.e. they were the result of acts of special creation by the Deity. The fact that species were capable of producing their kind naturally did not detract from the force of the argument. Even if the series of natural reproductions were infinite, as long as the species remained the same, the arrangement of the parts of an organism furnished an argument for prospective contrivance. It is clear that any suggestion that organisms had changed gradually over long periods of time so as to assume different forms, would if accepted, affect the terms of the argument.

The notion of gradual change in organisms leading to the transmutation of species did not first occur to Charles Darwin. Ideas of evolution had been discussed by Erasmus Darwin in the eighteenth century, and Lamarck and Geoffrey St. Hilaire in the early part of the nineteenth century, but their theories had not met with general acceptance because they failed to produce convincing explanations of how the transmutation of species might have come about. The idea of gradual change in the organic sphere, as the corollary of his theory of gradual change in the inorganic, had occurred to Charles Lyell as early as 1830. There are several indications of this in the correspondence between Charles Lyell and William Whewell.

Lyell was pleased with Whewell's review of the first volume of The Principles of Geology in the British Critic and was anxious that Whewell should also review volume two when it appeared. On December 4th, 1831, he wrote to Whewell to tell him that the first 300 pages of volume two would be published without delay.

Volume three was to follow in May 1832. He hoped that this part of the work would benefit from the lectures and diagrams that he would be giving and using at King's College, London, and also from the viva voce comment and reaction there. This was important to him since he intended to take up in Volume III the question of organic change and the origin and extinction of species which he had touched upon in the first volume. Thus he wrote to Whewell,

You will perceive that I have tried to leave the reader in suspense about the whole thing of successive creation. No doubt I have let out my opinion, because from having him familiar with all the evidence I cannot help having one which I expect to establish.

But I think it will relieve you of one great difficulty to say that as the question of 'whether org^c beings have come gradually or in batches' is confessedly one to be decided on geological evidence it is premature to discuss it in a review of the recent epoch phenomena. I have been anxious not to father them at first, and for fear of their gibbing I wished to keep back the theory which I believe to flow irresistibly from the facts now established by the succession of species in the fossils of the tertiary strata. Say nothing about this not coming out. I shall take a wicked pleasure in surprising some of our geological procrastinators. 1

There are several things here which suggest that Lyell as early as 1830 entertained a theory of the gradual organic change in nature i) He had deliberately left the issue unresolved in volumes one and two, but having put his readers in possession of all the evidence for gradual change in the inorganic world, it will appear that he must have a correlative theory for the living world. ii) Any such theory, he stated, must be decided by the geological evidence, but would seem to flow irresistibly from the facts relating to the succession of species in the fossils of the tertiary strata and their similarity to extant organisms. iii) For fear of 'them', possibly the public, but more likely the scientific establishment, 'gibbing', he had decided to keep back the theory, and enjoined secrecy on Whewell, but clearly intended at a later time to reveal his ideas and surprise the geological world.

1 Whewell Collection of Papers.

L.G. Wilson in his discussion of Lyell's treatment of this subject in the second volume of The Principles states:

There is a sense of anticlimax ... The reader has been led to see species as a totality of real entities, jostling one another for living space on the earth's surface. He has been shown that the continued life of a species of plant or animal depends not only on the continuance of a certain set of physical conditions, but also on the maintenance of a delicate balance in its interactions with numerous neighbouring species; that the conditions necessary for any one species cannot be maintained for long in the course of geological time; and that as a result species are becoming extinct. But, as to the source of new species to replace those extinguished or the question of the first origin of this extinct species, which must have had a beginning, as surely as it now has an end - with these questions the reader is left entirely in suspense. 1

In Volume I of The Principles there are several strong suggestions that changes in the animal and vegetable world were conformable to analogy, and preserved the chain of induction unbroken as much as change in the inorganic world did. For example, under the sub-heading, 'How the facts may be explained by assuming a uniform series of changes', he argued,

The readiest way, perhaps, of persuading the reader that we may dispense with great and sudden revolutions in the geological order of events, is by showing him how a regular and uninterrupted series of changes in the animate and inanimate world, may give rise to such breaks of sequence, and such unconformability of stratified rocks, as we usually thought to imply convulsions and catastrophes ... the order of events thus assumed to occur ... must be ... in accordance with the changes observed by man to be going on in the living as well as the inorganic creation. 2

(My italics)

In conclusion he stated

It appears that, in going back from the recent to the Eocene period, we are carried by many successive steps from the fauna now contemporary with man to an assemblage of fossil species wholly different from those now living. In this retrospect we have not yet succeeded in tracing back a perfect transition from the recent to an extinct fauna; but there are usually so many species in common to the groups which stand next in succession as to show that there is no great chasm, no signs of a crisis when one class of organic beings was annihilated to give place suddenly to another. This analogy, therefore, derived from a period of the earth's history which can best be compared with the present state of things, and more thoroughly investigated than any other, leads to the conclusion that the extinction and creation of species, has been and is the result of a slow and gradual change in the organic world. 3

1 L.G. Wilson, Chas Lyell, The Years to 1841, 339

2 Charles Lyell, The Principles of Geology, Vol. I., 175

3 Ibid., 179 & 180

Surprise has been expressed by a number of people that Lyell did not trace out what appeared to them to be the implications of his theory for the organic world. T.H. Huxley wrote in 1887,

I have recently read afresh the first edition of The Principles of Geology, and when I consider that this remarkable book had been nearly thirty years in everybody's hands, and that it brings home to any readers of ordinary intelligence a great principle and a great fact - the principle that the past must be explained by the present, unless good cause can be shown to the contrary; and the fact, that, so far as our knowledge of the past history of life on our globe goes, no such cause can be shown - I cannot but believe that Lyell, for others, as for myself, was the chief agent in smoothing the path for Darwin. For consistent uniformitarianism postulates evolution as much in the organic as in the inorganic world. The origin of a new species by other than ordinary agencies would be a vastly greater 'catastrophe' than any of those which Lyell successfully eliminated from sober geological thought. 1

H.C. Weston wrote to Charles Darwin on 21 Nov., 1859, shortly after the publication of The Origin of Species,

Now these novel views are brought fairly before the scientific public, it seems truly remarkable how so many of them could have failed to see the right road sooner. How could Sir C. Lyell, for instance, for thirty years read, write and think about the subject of species and their succession, and yet constantly look down the wrong road? 2

A.O. Lovejoy considers it psychologically an "odd fact" that Lyell was honestly able to combine "zealous uniformitarianism with an equally zealous anti-evolutionism", but this he attributes to Lyell being blind to the implications of his own theory. "Lyell in 1830 and for three decades thereafter was unable to recognise any such logical relation between uniformitarianism and the theory of organic evolution. The former did not appear to him to lend any support whatever to the latter". 3

Professor J.W. Judd who, though a much younger man, was a close friend and admirer of Lyell, considers that Lyell had a theory of evolution which he held back for fear of the consequences. In his book, The Coming of Evolution published in 1910, Judd states that from 1830 on Lyell was "convinced of the truth of the evolution of species" and "from the first he had seen that it

1 Life & Letters of Charles Darwin, Vol II, 190

2 Ibid., Vol II, 227

3 B. Glass (ed) Forerunners of Darwin, 367

would be impossible to avoid the conclusion that the principles which he was advancing with respect to the inorganic world must be equally applicable to the organic world. At first he only designed to touch lightly on this subject, in the concluding chapters of the first volume of The Principles and to devote the second volume to the application of his principles to the interpretation of the geological record. He, however, found it impossible to include the chapters on the changes in the organic world in the first volume, and then decided to make them the opening portion of the second volume". Judd adds, "... his intense interest in this part of his work is shown by his remark, 'If I have succeeded so well with inanimate matter, surely I shall make a lively thing when I have chiefly to talk of living things'". 1

Judd is of the opinion that Lyell held back his views on organic change because he was anxious not to arouse theological and scientific prejudice. It is clear from Lyell's correspondence with Scrope and others that he shows a certain innate caution in dealing with these subjects and that in fact he did withhold ideas and facts because of their possible impact and repercussions. On June 14, 1830 he wrote to Scrope, who had reviewed in the Quarterly the first volume of The Principles,

If I have said more than some will like, yet I give you my word that full half of my history and comments was cut out, and even many facts; because either I or Stokes or Broderip, felt that it was anticipating twenty or thirty years of the march of honest feeling to declare it undisguisedly". 2

He also wrote to his father prior to the publication of the first volume of The Principles,

I have gone over my first chapters and I think I have cut out all that any Bishop could object to so that if I was ever a candidate for a King's College Professorship I might send my book to Joshua Watson. But it will be difficult, I think, to state the facts and not endanger the popularity of a subject which the world can well do without. 3

1 J.W. Judd, The Coming of Evolution, 64 & 65

2 L.G. Wilson, Charles Lyell, The Years to 1841, 277

3 Ibid., 268

Lyell then had something to hide, but Judd's assertion that what he held back was a theory of evolution is difficult to reconcile with the fact that Lyell did not merely remain silent about this matter but actually argued against evolution and for the fixity of species in the third volume of The Principles.

Professor R. Hooykaas, in his book The Principle of Uniformity, argues that Lyell's uniformitarian geology was logically compatible with his position on the immutability of species. Huxley and others were wrong in believing that "consistent uniformitarianism postulates evolution as much in the organic as in the inorganic world". Hooykaas maintains that "Lyell's conception of a rather monotonous, almost a-historic existence of the earth did not favour evolutionary ideas ... If changes in the earth, as Lyell conceived them, caused corresponding changes in the organic world, the result would not be biological evolution, but random fluctuations: the consequences of the reactions of animals to their environment could be progressive as well as retrograde ..." ¹ The idea of evolution in terms of progressive development from the simple to the more complex, from the lower to the higher forms, is not implicit in uniformitarianism. This, Hooykaas argues, is the connection between Lyell's geology and his insistence in the third volume of The Principles upon the permanence of species.

What it would appear Lyell had in mind with regard to the organic world was the replacement of one animal population by another closely resembling it and that these were connected by descent rather than miraculous intervention. It was the allusion to the introduction of such populations by natural rather than supernatural means which Lyell feared might arouse opposition. He refers to this fear some years later in a letter to Whewell, "You remember what Herschel said in his letter to me, which you read. If I had stated as plainly as he had done the possibility of the introduction or origination of fresh species being a natural in contradistinction to a miraculous process I should have raised a host of prejudices against me ..." ²

1 R. Hooykaas, The Principle of Uniformity, 94

2 Whewell Collection of Papers, Add. M.S. a 208¹²⁸, 9

The actual words of Herschel's letter to Lyell dated Feb 20th, 1836 were:

Many will doubtless think your speculations too bold, but it is as well to face the difficulty at once ... we are led, by all analogy, to suppose that [the Creator] operates through a series of intermediate causes, and that in consequence the origination of fresh species, could it ever come under our cognisance, would be found to be a natural in contradistinction to a miraculous process - although we perceive no indications of any process actually in progress which is likely to issue in such a result. 1

Thus Paley's rather rigid view of species as each, with all its particular adaptations to its environment, having been created in that form originally and having remained the same ever since, was being challenged by the new climate of thought that was emerging during the first half of the nineteenth century. It was not an open or explicit challenge. Lyell's views were not evolutionary as Darwin's were later, but there was a growing awareness at this period of a chain of induction in the organic as well as the inorganic sphere; a growing conviction that animal populations were replaced by natural rather than supernatural means, which led to belief in a nexus of living things and in a certain plasticity in nature.

This seems to be what Darwin meant when later he wrote, "I always feel as if my books come half out of Lyell's brain ... for I have always thought 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". 2

II

The 'Vestiges'

The Vestiges of the Natural History of Creation published anonymously in 1844 was the catalyst of the period between Paley and Darwin, and focussed opinion upon the issues that had been raised by geology and palaeontology in the first half of the century. The author possessed none of the scientific spirit with which Lyell had approached his task. He was not influenced by the philosophy of uniformitarianism in the formation of his ideas. His main thesis was progressive development, which he derived rather from the opposite school of

1 C. Babbage, The Ninth Bridgewater Treatise. A Fragment (Second Ed: 1838), 226-7

2 More Letters of Charles Darwin, Vol II, 117

catastrophism. It was Buckland, Cuvier and Sedgwick who maintained a progressive development in geology and palaeontology, though each successive period was separated from that which went before by paroxysms and breaks in the sequence. The author of the Vestiges wished to discard the idea of discontinuity, but retain the notion of progression in the organic world.

The idea of the progressive development of the organic world had become associated with the catastrophist school early in the century, and it was claimed by its exponents to be the result of inductive reasoning, i.e. a development was observed in the fossils of the different strata the higher and more complex forms being situated above the lower and simpler. The claim, however, that the theory was based upon induction was not left unchallenged. Hugh Miller in his paper, "The Development Hypothesis in its Embryonic State: older than its alleged foundation", argued that in fact in the history of ideas the opposite was true. The theory of development of the Vestiges could not be compared, as its author would like it to be, with the theory of the solar system discovered by Galileo. The latter theory was the result of inductive reasoning, for it did not exist before: the former theory antedated the discovery of the facts of geology and palaeontology. "It existed as a wild dream ere Geology had any being as a science. It was an antecedent, not a consequent - a starting assumption, not a result. No one will contend that Maillet was a geologist. Geology had no place among the sciences in the age in which he lived, and even no name. And yet there is a translation of his Telliamed now lying before me, bearing date 1750, in which I find very nearly the same account given of the origin of animals and plants as that in the Vestiges ..." ¹

The principal criticism of the Vestiges was that it was a web of speculation without the support of any true science.

¹ Hugh Miller, Foot-prints of the Creator, 257-9

Adam Sedgwick in the Edinburgh Review for July 1845 stated,

All in the book is shallow and all is at second hand ... we venture to affirm that no man who has any name in science, properly so called, whether derived from profound study, or original labour in the field, has spoken well of the book, or regarded it with any feelings but those of deep aversion. We say this advisedly after exchanging thoughts with some of the best informed men in Britain. The public who are not able to judge from their own knowledge must therefore be plainly told, that the philosophy of the author is borrowed from a false and shallow school; and that the consequences he draws from it, so far as they are new in the scientific literature of our country, are nothing better than mischievous and anti-social nonsense . 1

There is a difference between the rash conclusions and the extravagant analogies to which the author of the Vestiges was given, and the sober method of inductive reasoning which proceeds step by step. On most counts, but specially that of palaeontology, the author of the Vestiges was accused of rearranging the empirical evidence to suit the hypothesis of development. "And in the name of common sense, what is this, but to shuffle nature's cards so as to play with them a cheating game?"² The whole drift of the Vestiges ran counter to "the right principles of physical reasoning, which cannot be too often brought before the mind. As all our exact knowledge of the 'celestial mechanics' is derived from our previous knowledge of the laws of matter studied on the earth, so all our exact knowledge of the organic laws of the old world can only be learnt from a study of the organic phenomena of living nature. With such phenomena we must begin or we have no philosophical starting point. If we desert this sober method, we are only playing among the crazy systems of the philosophers, or men who falsely pass under that sacred name."³ Chambers left himself open to such attack because he shrugged off the difficulty that organisms showed no tendency to produce new species in the historical period by saying that development had ceased since ancient times.

Blackwood's Edinburgh Magazine for April 1845 commends the intention of the author "to collect and arrange whatever hints or fragments of knowledge science affords, enabling us to bring the successive phenomena of creation under the formula of general laws ... But unfortunately what the author has collated as

1 Edinburgh Review, (July 1845), p. 3

2 Ibid., 41

3 Ibid., 50

the results of science are, in some instances, little else than the wild guess-work of speculation ..."¹

The North British Review for 1845 regarded the book as "lacking all scientific knowledge and experience"², and Hugh Miller accused Chambers in the Sequel to the Vestiges of "... appealing from science to the want of it"³ when Chambers argued that although "nearly all the scientific men are opposed to the theory of the Vestiges" this in truth counted for very little, since the narrowness of each scientists' limited field made it impossible for him to appreciate the breadth of his (Chambers') theory.

The Vestiges was widely considered to be a highly speculative and, at times, farcical attempt to put before the public a comprehensive theory of development. His reference to the experiments of Mr. Crosse and Mr. Weekes in the spontaneous generation of acari involved him in patent absurdities. As one reviewer pointed out, if this were indeed the case then his theory of development was at an end, "... for these were not monads ... but they belonged to the highest type of articulata. If Mr. Crosse did witness the creation of an acarus, then he witnessed an act of special creation, and the author's law of organic development is at an end".⁴

The development theory was rejected not primarily on theological, but on scientific grounds. It was scientific arguments that were chiefly brought against the speculations of Chambers. The book was said to be based upon a priori reasoning; it proceeded with an unsupported hypothesis rather than step by step inductive argument. The chief scientific arguments urged against Chambers were in the fields of palaeontology and embryology.

1 Blackwood's Edinburgh Magazine, (April 1845), 449

2 North British Review, (1845), 507

3 Hugh Miller, Footprints, 262

4 British Quarterly Review, (1845), 531

Those from palaeontology stressed i) The discontinuity between fossil species, and the absence of intermediate or "ambiguous" forms. ii) The lowest forms are not necessarily found in the lowest strata, and the more complicated in the higher in a naturally ascending scale. Nature, Sedgwick wrote, "refuses to work at our dictation. We are describing phenomena that we have seen. We have spent years of active life among these ancient strata, looking for (and we might say longing for) some arrangement of the fossils which might fall in with our preconceived notions of a natural ascending scale. But we have looked in vain ... " ¹

These arguments were supported by the highest scientific authorities of the age. Professor Owen, the great anatomist, was appealed to, "Does the hypothesis of the transmutation of species afford any explanation of these surprising phenomena? Do the speculations of Maillet, Lamarck and Geoffrey derive any support from this department of palaeontology? He (Owen) answers the question in the negative by a rigid appeal to facts and anatomical conditions, and he tells us that a slight survey of organic remains might serve to support these views." ²
"Geology offers one firm cumulative argument against the hypothesis of development" ³

The argument from embryology which was opposed to that of Chambers' theory, was that true foetal development did not reflect the superficial and ideal resemblance which Chambers supposed it to have to the development of all life on the planet. First, several important stages in that development which are supposed to have taken place are missed out altogether in the development of the human embryo. "It does not pass through successive stages of a polygastic animalcule, a sponge, a polyp, a mollusk, an insect, and so on - the ova of the mammalia are from the beginning vertebrate ova, and they do not pass through stages having the characteristics of animals belonging to the invertebrate class" ⁴

1 Edinburgh Review, (1845), 30 & 31

2 Ibid., 58

3 Ibid., 62

4 British Quarterly Review, (1845), 504.

In the second place, Chambers' view that the development of the foetus through successive stages and its final form are determined by the period of gestation, and that prolonged gestation might yet result in higher forms of life were contrary to the laws of foetal development. "We cannot", says the Edinburgh Review "hatch a rat from a goose's egg, because all the organic membranes evolved during the process have a prospective reference to the ultimate form of a bird, and it is physically impossible, if they be not fatally interrupted, that they should be anything else, for the end is involved by strict anatomical necessity in the previous conditions of the organic membrane".¹ Blackwood's Edinburgh Magazine made the same point. "If it is to be a mammal it must be fashioned² accordingly from the very beginning". This was the position that microscopic research upheld.

These arguments similarly derived from high scientific authority. The greatest embryologist of the age had declared himself on this subject. Karl Ernst von Baer had written in 1828 in the first volume of Uber Entwicklungsgeschichte der Thiere "The embryo of the vertebrate animal is from the very first a vertebrate animal, and at no time agrees with an invertebrate animal. A permanent animal form, however, which exhibits the vertebrate type, and yet possesses so slight a histological and morphological differentiation as the embryos of the Vertebrata, is unknown. Therefore, the embryos of the Vertebrata pass in the course of their development through no (known) permanent forms of animals whatsoever".³

It would appear that the main attack upon the Vestiges came from scientific rather than theological sources for two reasons. In the first place, this was considered to be a straight-forward scientific question. Could the development hypothesis be supported by sound scientific arguments? The whole tenor of scientific thought at that time seemed to militate against it. The best scientists and the strongest empirical arguments were opposed to it.

1 Edinburgh Review, (1845), 76

2 Blackwood's Edinburgh Magazine, (1845), 456

3 A. Henfrey and T.M. Huxley, Scientific Memoirs - Natural History (1853), 210
Translation by Huxley from von Baer.

In the second place, Chambers had himself made no attack upon natural theology, and in particular had not set himself to oppose design in creation, but rather uphold it. He made explicit and approving reference to the Bridgewater Treatises which, he declared, "... place the subject (of design) in so clear a light that the general postulate may be taken for granted".¹

It has been one of the most agreeable tasks of modern science to trace the wonderfully exact adaptations of the organization of animals to the physical circumstances amidst which they are destined to live. From the mandibles of insects to the hand of man, all is seen to be in the most harmonious relation to the things of the outward world, thus clearly proving that design presided in the creation of the whole - design again implying a designer, another word for a Creator . 2

He thus endorses, despite the novelty of his theory of development, the main argument of Paley's Natural Theology. And in view of the important place natural theology held in the scheme of religion at that period this no doubt shielded him from a great deal of criticism.

But more than this, Chambers sincerely believed that by expounding his theory of development he could place the concept of design and purpose in nature upon an even firmer footing. The development of the organic world, in his view, as indeed of the whole creation, was simply the working out of the archetypal plan in the mind of the Creator, but the implementation of it must be understood in terms of natural laws laid down by the Creator at the beginning. This idea about how the Deity worked, was more in keeping, he believed, with the true conception of the greatness of God, than the anthropomorphism of those who attributed every special creation to his personal intervention. His contention was that as law prevails in the inorganic world and is responsible for the development of the material universe, so it must also be regarded as obtaining in the development and emergence of species in the organic world. "The Eternal One has arranged everything beforehand and trusted all to the operation of the laws of his appointment, himself being ever present in all things".³ This did not rule

1 The Vestiges of Creation, 1844 (published anonymously, but later attributed to R. Chambers), 325

2 Ibid., 324

3 Ibid., 183

out design, but on the contrary, regarded it as being inherent in the structure of the universe and its laws from the beginning; each development of the organic and inorganic world having been planned and provided for from the first.

Chambers rejected Lamarckism, ¹

Such a regularity in the structure, as we call it, of the classification of animals as is shown in their system, is totally irreconcilable with the idea of form going on to form merely as needs and wishes in the animals themselves dictated. Had such been the case all would have been irregular. ² But the whole plan of being is as symmetrical as the plan of a house, or the laying out of an old fashioned garden ! This must needs have been devised and arranged for beforehand. And what a preconception and forethought have we here ! Let us only for a moment consider how various are the external physical conditions in which animals live - climate, soil, temperature, land, water, air - the peculiarities of food and the various ways in which it is to be sought, and the peculiar circumstances in which the business of reproduction and the care-taking of the young are to be attended to - all these required to be taken into account, and thousands of animals were to be formed suitable in organization and mental character for the concerns they were to have with these various conditions and circumstances - I say, only consider these things, and we shall see that the decreeing of laws about the whole was an act involving such a degree of wisdom and device as we only can attribute adoringly to the Eternal and Unchangeable . ³

Thus he thought to enhance our conception of God by attributing all to an original decree of the Deity, instead of to special acts of creation. In fact the wisdom and forethought of God are no greater, because the whole structure of the universe is considered to be contained in one primary decree, rather than in successive and specific acts of creation. If the whole is to cohere and each part relate to the others in the way that Chambers states, the mode of operation is really irrelevant to the degree of wisdom and forethought

- 1 Chambers in the Vestiges is very dependent upon Geoffrey St. Hilaire especially in his embryology, which is supposed to reflect the chronological development of species. He rejects Lamarck and at first attributes organic changes exclusively to external circumstances. Later he comes to disavow this, and argues that it must be attributable to some organic law itself. He posits an 'inherent impulse of life', not realizing that this is the heart of the Lamarckian system. He believes that Lamarck's theory is development by 'the wants of the animals' and the force of external circumstances.
See R. Hooykaas The Principle of Uniformity, 91 & 92
- 2 William Paley put forward exactly the same argument regarding the regularity of organic nature to controvert the notion of random evolution. (see Ch. I, p.27 of this thesis).
- 3 The Vestiges of Creation, 232 & 233.

necessary to its conception. Therefore, there is in principle no difference between the understanding of design in the universe that we find in Paley and that of the Vestiges. Chambers was troubled by the feeling that it was unworthy to think of the Deity as soiling his hands, as it were, with specific acts of creation. This was altogether unfitting and anthropomorphic. Some way must be found by which the Deity may be lifted above such paltry interventions.

We meet with the same deistic spirit in Darwin and, in fact, it is worth comparing the two passages, one from the Vestiges, published in 1844, and the other from Darwin's second sketch of the Origin, written in 1844, in which these views are expressed.

How can we suppose that the august Being who brought all these countless worlds into form by the simple establishment of a natural principle flowing from his mind was to interfere personally and specially on every occasion when a new shell fish or reptile was to be ushered into existence on one of these worlds. (The Vestiges)¹

And then Darwin's view,

It accords with that we know of the laws impressed by the Creator on matter that the production and extinction of forms should, like the birth and death of individuals, be the result of secondary means. It is derogatory that the Creator of countless universes should have made by individual acts of his will the myriads of creeping parasites and worms. (Darwin's Essay 1844) 2

The argument from design was not overtly threatened by the publication of the Vestiges. Design was, according to Chambers, inherent in the principle that flowed from the mind of the Creator. He took a Deistic view of the subject, as opposed to the theistic view of Paley and the authors of the Bridgewater Treatises. But he upheld the notion of prevenient wisdom and prospective contrivance in the creation and structure of the world and the vegetable and animal life that dwelt upon it. This would appear to account for the fact that the attack upon the Vestiges derived more from science than theology.

1 The Vestiges of Creation, 154

2 The Foundation of the Origin of Species, Ed. Francis Darwin, (1909), 253 & 254

There was some uneasiness, however about the tendency to subsume everything under natural laws, even if these laws were ultimately attributed to an all-wise Creator. It had the effect of making God very remote from the world in the minds of people; so remote that it could be said to be a matter of indifference whether he was mentioned at all. Thus one reviewer suggested that the Vestiges heralded "infidel times",¹ and another, conscious of the tension created by Chambers' insistence upon a final cause and yet his desire to explain everything in terms of natural law, says, "that while he tries to set up a system which destroys all semblance of any 'final cause'", he also wants to be regarded as "a good theist".²

But Chambers' theory of development, in accepting positively the notion of design in creation, was very different from the theory of transmutation which was to follow in The Origin of Species and must have done something to predispose the public to regard the hypothesis as not incompatible with religious convictions, though of a deistic kind. The work was very popular with the public at large, but not with scientific men. Darwin said later of the Vestiges, "In my opinion it has done excellent service in this country in calling attention to the subject, in removing prejudice, and in thus preparing the way for the reception of analogous views."³

1 North British Review, (May-August 1845), 471

2 Edinburgh Review, (1845), 11 & 12

3 J.W. Judd, The Coming of Evolution, 94

THE STATUS AND CHARACTER OF DARWIN'S THEORY OF EVOLUTION
CONSIDERED IN RELATION TO THE DESIGN ARGUMENT.

A.O. Lovejoy in a paper entitled, "The Argument for Organic Evolution before the Origin of Species 1830 - 1858," puts forward the view that all the principal arguments that were employed by Darwin and the advocates of evolution after 1859 were known to, and employed by, the much abused author of the Vestiges in 1845. "... both in its defensive and offensive side, the logical status of the argument was the same before and after the publication of Darwin's great work. Not only were the indisputable relevant facts most favourable to the evolutionist theory already sufficiently proved, most of them before 1844; but also the apparent gaps or flaws in the evidence, which could be plausibly exhibited by the opponents of the theory during the fifteen years preceding the appearance of the 'Origin of Species', were not removed in 1859 nor for a number of years thereafter. Whatever force the arguments for the transformist conception had after that year, they had before it, and whatever weakness they had before it, they still had after it." ¹

If this is true, then we must look for reasons, other than purely scientific ones, for the success of the Darwinian hypothesis, and its general acceptance after 1859. T.H. Huxley has himself suggested that there is an air of mystery surrounding the subject of the acceptance of evolution. In his essay, On the Reception of the Origin of Species, written some thirty years after the event, he asks, "What then are the causes which led instructed and fair-judging men of that day to arrive at a judgment so different from that which seems just and fair to those who follow them? That is really one of the most interesting of all questions connected with the history of science." ² An attempt to answer this question will give us a clearer conception of the real philosophical character of Darwin's argument.

1 B. Glass (ed.), Forerunners of Darwin, 380. Cf. Appendix 1.

2 Life and Letters of Charles Darwin, Ed. Francis Darwin, Vol. II, p.187

Lovejoy is not alone in asserting that all the principal facts relating to the theory of the transmutation of species were well known before the advent of Darwin's main work. Ernst Krause, biographer of Charles Darwin's grandfather, Erasmus Darwin, has written, "One must confess that on the whole the Origin of Species hardly adds anything more to what has been expressed before".¹

Many of Darwin's contemporaries also considered that his book added little that was new in the way of facts to the speculation about the transmutation of species. The Edinburgh Review for April 1860 carried an article by Richard Owen, the leading anatomist of the age, which was severely critical of Darwin's work in this respect. Darwin attributed this to personal animus against him and professional jealousy, and was never reconciled to Owen because of it. After citing several of Darwin's observations, (viz. the folds of the Pedunculated Cirripedes, which appear to have changed from respiratory organs into origenous organs; the slave-making instincts of ants; the cell making instincts of bees; the transportation of molluscs and seeds on the feet of birds; and the variations of pigeons under domestication), Owen comments, "These are the most important original observations recorded in the volume of 1859. They are, in our estimation, its real gems - few indeed and far apart, and leaving the determination of the origin of species very nearly where the author found it."²

Samuel Wilberforce, Bishop of Oxford,³ also complained of the paucity of facts in The Origin when he wrote, in the Quarterly Review for July - October 1860, of how Darwin went through the 'plasticity' of nature under domestication, all of which was known. This may be of great interest to pigeon fanciers and pleasant writing

¹ Quoted by Gerhard Michler in Charles Darwin: The Founder of the Theory of Evolution and Natural Selection, (1961), p.xiv
² Edinburgh Review, (April 1860), 495

³ Owen Chadwick attacks the mythology that has grown up around the British Academy debate in 1861, which has simplified and caricatured the principal figures, T.H. Huxley and Samuel Wilberforce - "empirical and instructed professor versus ignorant, rhetorical and obscurantist bishop... A small number of letters from eye-witnesses survives. It is clear that the speech of J.D. Hooker, and not the speech of Huxley, made the big impression on the audience in countering the bishop's arguments for the perpetuity instead of the evolution of species. It is clear that the bishop's arguments (which he seems to have learnt from Professor Owen) were genuine and formidable arguments." The Victorian Church Vol. II, 10

... but what step do we really gain in it all towards establishing the alleged fact that varieties are but species in the act of formation, or in establishing Mr. Darwin's position that a well-marked variety may be called an incipient species? We affirm positively that no single fact tending even in that direction is brought forward. On the contrary, every one points distinctly towards the opposite conclusion; for with all the change wrought in the appearance, with all the apparent variation in manners, there is not the faintest beginning of any such change in what the great comparative anatomist, Professor Owen, calls, 'the characterisation of the skeleton, or the parts of the frame upon which specific differences are founded. 1

"We think it difficult," Wilberforce went on, "to find a theory fuller of assumptions; and of assumptions not grounded upon alleged facts of nature, but which are absolutely opposed to all the facts we have been able to observe." 2

The links, the ambiguous forms are missing. Where are the examples of favourable varieties in nature, living or dead? 3

The article in the National Review Jan. 1860, on the Origin made a similar point, while generally being more favourable to the book. The writer, W.B. Carpenter, an eminent physiologist, concluded his article thus,

The history of every science shows us that the great epochs of its progress are those not so much of new discoveries of facts, as those of new ideas which have served for the colligation of facts previously known into general principles, and which have thenceforward given a new direction to inquiry. It is on this point of view that we attach the highest value to Mr. Darwin's work. 4

Sedgwick in a letter to Livingstone, 16 March 1865, also revealed his conviction that Darwin's book had brought to light nothing new in the way of facts relating to the argument for the transmutation of species. "Darwin", he wrote, "has made the theory popular, but he has not added one single fact that helps it forward, and I think it appeared (about sixty five years since) far better in the poetry of the grandfather, than now in the prose of the grandson". 5

1 Quarterly Review, (July - Oct., 1860), 235

2 Ibid., 237

3 Ibid., 239

4 National Review, (Jan. 1860), 214

5 Life and Letters of the Reverend Adam Sedgwick, J.W. Clark and T. McK. Hughes, (1890), Vo. I, 411

The reviewer in The Annals and Magazine of Natural History, 1861, wrote,

That a book having the name of Charles Darwin on its title-page would be extensively read, is a matter of course; but that, without containing the smallest tittle of new evidence on the subject of the evolution of one species from another, it should have been regarded as establishing that theory, may well excite our surprise. 1

It may be argued that some of the reviews and opinions quoted here stemmed from people who were hostile to Darwin's theory, and that, of course, is true, and some have stated their case more strongly than others. But when we take that into account, there still remains the charge, which ultimately is not a matter of opinion, that Darwin had adduced virtually no new evidence to substantiate his theory. It is interesting that T.H. Huxley, the friend and advocate of Darwin's evolutionary views, his 'bulldog' as Darwin called him, corroborated this when he later wrote,

My reflection, when I first made myself master of the central idea of the Origin was, 'How extremely stupid not to have thought of that' ... The facts of variability, of the struggle for existence, of adaptation to conditions, were notorious enough; but none of us had suspected that the road to the heart of the species problem lay through them, until Darwin and Wallace dispelled the darkness, and the beacon fire of the Origin guided the benighted. 2

Darwin, therefore, relied almost entirely upon the refinement and rearrangement of facts, arguments and ideas which were generally known during the period immediately preceding the publication of the Origin. Darwin was sensitive to a number of criticisms, particularly the one made by Sedgwick and others, that he had departed from the narrow path of inductive argument and embarked upon the broad way of hypothesis. Such criticisms he was most anxious to rebut. However, he made no reference to the charge of adducing no new facts. Thus the contemporary evidence bears out the contention that, both before and after the advent of the Origin, the state of the argument regarding the transmutation of species remained substantially the same. The arguments used after 1859 to establish the theory of evolution were principally those employed before.

1 The Annals and Magazine of Natural History, Third Series, VII (1861), 399

2 Life and Letters of Charles Darwin, Ed. Francis Darwin, Vol. II, 197

Another thing that would appear to support this view is the episode of the Linnean Society. Darwin had for long feared that he might be forestalled in the publication of his theory. He had written a draft of it in 1844 with instructions that it should be published in the event of his death. On June 15th, 1858 Darwin received a paper from Alfred Wallace giving in outline the very same theory of evolution by means of natural selection which he had himself pondered for so many years. Darwin was at a loss what to do. He wrote to Lyell and Hooker for advice, and they suggested the expedient of a joint paper from both Wallace and Darwin to be read at the Linnean Society. Darwin agreed and left the matter in their hands. The joint paper was read at the meeting of the Society on July 1st. and later published in the Society's 'Journal'.¹ It made little impact upon the scientific world. "Our joint productions", Darwin wrote afterwards in his autobiography, "excited very little attention, and the only published notice of them which I can remember was by Professor Haughton of Dublin, whose verdict was that all that was new in them was false, and what was true was old."² Darwin added, "This shows how necessary it is that any new view should be explained at considerable length in order to arouse public attention."³ There is another and, perhaps, more important reason why Darwin's argument needed fuller exposition in order to make any impact, and we shall return to this later. The point now is that there appeared to be very little, factually, that was new in this work. The President of the Linnean Society was himself unaware that this joint paper was the opening salvo in the great evolutionary battle. At the general meeting he reported to members that, "The year 1858 has not, indeed, been marked by any of those striking discoveries which at once revolutionise, so to speak, the department of science on which they bear".⁴

1 Journal of the Proceedings of the Linnean Society, (1858), Vol. III, 53

2 In a letter to J.D. Hooker, April or May 1859, Darwin wrote, "... I enclose a criticism, a taste of the future - Rev. S. Haughton's address to the Geological Society, Dublin, Feb. 9th, 1858 'This speculation of Messrs. Darwin and Wallace would not be worthy of notice were it not for the weight of authority of the names (i.e. Lyell's and yours), under whose auspices it has been brought forward. If it means what it says, it is a truism; if it means anything more it is contrary to fact.' Q.E.D." Life and Letters of Charles Darwin Vol. II, 157

3 Autobiographies, C. Darwin and T.H. Huxley, Ed. G. de Beer, (1974), 72

4 Journal of the Proceedings of the Linnean Society, Vol. IV, viii

The first announcement to the world of the theory of evolution by natural selection had fallen completely flat.¹

The new element introduced by Darwin into the discussion of species was not so much in the realm of fact, but of principle; it was the notion of Natural Selection, which he had stumbled upon when reading Malthus for amusement. What he had succeeded in doing as a result of adopting that principle as a vera causa of the origin of species was to present already known facts in a new light.

As A. Ellegaard put it,

Darwin did not contribute much really new information on the variation that occurs in species, or their frequency, extent and inheritance, nor on the causes that produced them. In fact, he repeatedly admitted that those problems remained almost completely unsolved. But in the Origin he was not particularly concerned with such details; his main object was to establish a solution of the species problem that would render superfluous any reference to supernatural causes in their production ... Darwin's Natural Selection theory, which was the revolutionary and radically new element in his doctrine, would achieve this. 2

Or, as the same writer put it again more succinctly, "The real issue between Darwin and his opponents, therefore, was not a factual one, but concerned the interpretation of the facts."³ Louis Agassiz, in The Atlantic Monthly, January, 1874, wrote,

Darwin's works and those of his followers have added nothing new to our previous knowledge concerning the origin of man and his associates in domestic life, the horse, the cow, the sheep, the dog, or, indeed, of any animal. The facts upon which Darwin, Wallace, Haeckel, and others base their views are in the possession of every well-educated naturalist. It is only a question of interpretation, not of discovery of new and unlooked-for information. 4

1 "The 1st July Linnean Society papers, when published in October 1858, only influenced a very few naturalists", To be an Invalid, R. Colp, M.D. 1977. It might be added that even those, like J.D. Hooker, who declared in their favour, had already been influenced before the actual publication by discussion with Darwin, rather than by the publication of these papers.

2 A. Ellegaard, Darwin and the General Reader, 12 & 13

3 Ibid., 120

4 L. Agassiz, 'Evolution and Permanence of Type', in The Atlantic Monthly XXXIII (January-June 1874), 96

Darwin had succeeded in presenting known facts in a new light. But it was not the other way about; it was not that the discovery of new facts had led him to adopt a working hypothesis to explain them. The truth of this may be illustrated biographically in terms of Darwin's own experience and development. In October 1838, very soon after he had begun to reflect seriously upon the species question, and had opened his first note-book on the subject, he chanced to read Malthus' Essay on the Principle of Population. "It at once struck me", he wrote later, "that under these circumstances favourable variations would tend to be preserved, and unfavourable ones to be destroyed. The result of this would be the formation of new species. Here then I had at last got a theory by which to work ..."¹

Having obtained his theory, he was thereafter principally concerned with collecting facts to illustrate it. The following observations on Darwin's fact finding methods are interesting. "The casualness of Darwin's fact-collecting methods is very endearing. He welcomed information from any source, provided it fitted in with his new theory of mutability. His informants could be his father, his gardener, his pen-friends or anyone who had something helpful to say. 'Strong odours of negroes - a point of real repugnance.' 'The cat had its tail cut off in Shrewsbury and its kittens had all short tails; but one a little longer than the rest; they all died. She had kittens before and afterwards with tails.' The facts ... do not appear to have been collected or tested with any particular care. The vital factor was that they should illustrate his theory. In this respect Darwin was contradictory; at times he spoke as the dispassionate scientist concerned only with the truth and prepared to jettison his beloved theory should the facts disprove it, at other times the theory was for him all important and any facts would do, provided they supported it. In a letter to Lyell, shortly after the publication of the 'Origin of Species', he prided himself on having invented a theory and then seeing 'how many classes of facts the theory would explain'"²

¹ Life and Letters of Chas. Darwin, Vol. I, 83

² John Chancellor, Charles Darwin, (1973), 160

Thus, what we have in the development of Darwin's theory is, first, the intuitive discovery of a principle, viz., natural selection, which afterwards is used to illuminate and explain an existing, and already known body of facts, together with the steady accumulation of further illustrations from the common stock of knowledge on the several subjects relating to it. At this point it would be difficult not to notice a remarkable similarity between the logical structure of Darwin's argument from Natural Selection, and the argument from design. This may be illustrated from his note-books and correspondence.

As early as 1837-8 Darwin's mind was moving strongly in the direction of descent of the 'whole organic kingdom' from plants to man. This was before he had read Malthus and lighted upon the principle of Natural Selection. Gertrude Himmelfarb considers that by the time Darwin was in the process of writing the second of his note books, which he commenced about July 1837, he was "entirely committed" emotionally, if not by the strict canons of scientific enquiry, to evolution.¹ The two following extracts from his note-book completed between July 1837 and February 1838 indicate the strength of this a priori view of evolution which he entertained.

If we choose to let conjecture run wild, then animals our fellow brethren in pain, disease, death, suffering and famine - our slaves in the most laborious works, our companions in our amusements - they may partake [of?] an origin in one common ancestor - we may all be melted together. 2

The different intellects of men and animals not so great as between living things without thought (plants) and living things with thought (animals). 3

1 G. Himmelfarb, Darwin and the Darwinian Revolution, 127

2 Life and Letters of Chas. Darwin, Vol. I, 6

3 Notebook 'C', 214

Sir Gavin de Beer thinks it doubtful whether Darwin actually derived the idea of Natural Selection from Malthus, for he argues that there are many indications that Darwin himself was already aware of the significance of the struggle for existence and its importance for the preservation of favoured races. Writing to Henry Fawcett in about 1876, Darwin stated, "I clearly saw that selection was man's chief means. When I had got thus far I strongly suspected that this was the key to nature's work."

This, de Beer argues, is borne out in the First Notebook

where he observed that the Southern rhea, not being well adapted, might 'perish out', while another bird (the mocking bird), being well adapted, would increase and flourish. He went on, 'death of a species is a consequence of non-adaptation'. Here was clear recognition of the importance of favourable variation and efficient adaptation for survival, by natural selection of the more numerous parents of successive generations.¹

Perhaps the reading of Malthus served to formulate what before was latent, but unclear in his mind. It appears, however, that from that time, in the autumn of 1838, when he read Malthus, he felt that he was equipped with a principle which could explain the derivation and descent of one species from another.

We must here lay emphasis upon two things which are important for this argument. First, the emergence of the principle of natural selection at the beginning of Darwin's researches rather than the end, and, secondly, that this principle came to a mind already strongly influenced in the direction of descent or evolution of all organic beings, both plant and animal, from some one original form. It is difficult, therefore, to see in this what Darwin afterwards so strongly insisted on, viz., that his method was strictly inductive and that he discovered his theory of descent by natural selection only after painstakingly collecting all the facts bearing upon the subject and pondering them for many years. There seemed to be some confusion in Darwin's mind on this point, which grew as the years went on.

¹ Autobiographies, C. Darwin & T.H. Huxley, Ed. G. de Beer, x.

He would frequently mention in his letters to those whom he hoped to convert to his views, how many years it had taken him "to come round." Thus, to Lyell, 1859, "I am foolishly anxious for your verdict [on the Origin] not that I shall be disappointed if you are not converted; for I remember the long years it took me to come round ..." ¹ To Jenyns, 1859, "I know perfectly well that you will not agree with the lengths to which I go. It took long years to convert me ..." ² To W.B. Carpenter 1859, "I look at it as immaterial whether we go quite the same lengths ... I quite agree the principle is everything ... when I reflect how very slowly I came round myself, I am in truth astonished at the candour shown by Lyell, Hooker, Huxley and yourself." ³ and so on.

Later, Darwin clearly thought of his conversion to acceptance of the theory of evolution by natural selection as a long and painstaking process, coming as the conclusion of a train of inductive reasoning. This was no doubt how he wanted to think of it, but the truth was otherwise. Francis Darwin himself acknowledged that such an opinion is irreconcilable with the evidence of the 1837 note book. ⁴ Darwin was already, at that time, convinced of the truth of the principle of natural selection and evolution. What happened afterwards, in the years that followed, was not his conversion to these ideas, but rather his confirmation as the steady accumulation of facts, i.e. of favourable illustrations and examples, made a deeper and deeper impression upon his mind and their cumulative force heightened the vividness of the concepts in his imagination. What took place in Darwin's experience in 1838, and in the subsequent development of his thought can be better explained if we regard his theory as the counter part or antithesis of the argument from design, (which cannot be put in the category of a scientific or strictly inductive argument), and if we thus recognise in it the same logical character and structure.

1 Life and Letters of Chas. Darwin, Vol. II, 167

2 Ibid., 220

3 Ibid., 240

4 Ibid., 38

The argument from design begins with an a priori concept, which is intuitively discerned in natural phenomena. This concept is thereafter strengthened and elaborated by constantly 'bearing the subject in mind' and piling up successive examples and illustrations of its role. This is extended further and further by analogy until it becomes all embracing and affords a world view.

In our study of the design argument we have noticed the special character and form of the argument. It is not like a straight-forward conclusion inferred from certain premises, its nature and effects are very much more pervasive and general, its strength is more psychological than logical or rational. Its full influence and force are felt only when the subject is kept constantly before the mind, so that the cumulative effect of illustrations and examples of design are allowed to make their impression, not merely upon the intellect, but also upon the imagination. Paley put the matter well, when he said, It needs like a medicine to get into the system. "It is one thing to assent to a proposition of this sort, another and very different thing to have properly imbibed its influence".¹ The strength of the argument lies in its power to conquer the imagination and to see the whole of nature as conforming to the principle of design. But this cannot be brought about by mere logical argument. It does not, as Newman would say, live in a conclusion. The bare statement of the case, of the premises and inference to be shown therefrom, will not effect this dominance of the imagination, this capturing of the mind. It will not make the argument real to the individual. That can only be accomplished by the power of cumulative expression, the assembling of facts and examples in extended illustration of the principle being exemplified.

Now we see this pattern emerging in Darwin's understanding of his own work on The Origin of Species, and the way in which he and others came to accept the argument for descent by Natural Selection.

¹ See this thesis, ch. 2 p.57

First, Darwin insisted that the full effects of the argument of The Origin could only be experienced if the subject were kept constantly before the mind. Thus, to Charles Lyell, he wrote in 1859, "You will come more and more round the longer you keep the subject before your mind." ¹ Again to L. Jenyns in 1860, "You will think it presumptuous, but I am convinced if circumstances lead you to keep the subject in mind that you will go further". ² To Asa Gray he wrote, "I feel pretty sure, from my own experience that if you are led by your studies to keep the subject of the origin of species before your mind you will go further and further in your belief." ³

Darwin cites a testimony to the psychological soundness of this advice, given by Thwaites from Ceylon, "who was much opposed to me." "He now says, 'I find that the more familiar I become with your views in connection with the various phenomena of nature, the more they commend themselves to my mind.'" ⁴ Six months earlier Darwin had written to Thwaites, "You will think it presumptuous, but I am well convinced from my own mental experience that if you keep the subject at all before your mind you will ultimately go farther". Darwin often suggested that his book should be read several times to produce the desired effect of converting the mind to evolutionary views. The truth of this, also, was borne out in the experience of a number of those who came to embrace Darwinism after being initially opposed to it. Thus B.D. Walsh wrote, April 27, 1864, "The first perusal staggered me, the second convinced me, and the oftener I read it the more convinced I am of the general soundness of your theory". ⁵ "I have had an enormous letter," Darwin wrote to J.D. Hooker, "from Leo Lesquereux ... he wrote some excellent articles in 'Silliman' against [my] Origin views, but he says now after repeated reading of the book, he is a convert." ⁶ Darwin's argument was much too vague to be of the nature of scientific demonstration.

1 Life and Letters of Chas. Darwin, Vol. II 170

2 Ibid., 263 3 Ibid., 273 4 Ibid., 347

5 Ibid., 249 6 Ibid., 260

It was not so much inductive as cumulative and illustrative.¹ It was necessary for the subject to be "kept before the mind" in order that the imagination might be conquered.

One of the greatest stumbling blocks to the acceptance of Darwin's ideas was the difficulty of imagining or conceiving that such organs as the eye could be produced by the gradual accumulation of chance variations by natural selection. Charles Lyell warned of the difficulty. Writing with some advice on The Origin he said,

... The first page of this most important summary gives the adversary an advantage, by putting forth so abruptly and crudely such a startling objection as the formation of 'the eye', not by means analogous to man's reason, or rather by some power immeasurably superior to human reason, but by super-induced variation like those of which a cattle-breeder avails himself. 2

Asa Gray likewise found this passage difficult,

... what seems to me the weakest point in the book is the attempt to account for the formations of organs, the making of eyes, etc., by natural selection. Some of this reads quite Lamarckian. 3

Darwin knew what they were talking about. He frequently refers to the great difficulty he had himself experienced in this respect, and specially with regard to the eye. But because to him the principle of natural selection was invincible, and the prospect of the alternative of special creation unthinkable, the imagination had to be conquered. He wrote in reply to Asa Gray, "About the weak points I agree. The eye to this day gives me a cold shudder, but when I think of the fine known gradations, my reason (sic) tells me that I ought to conquer the cold shudder ..." 4 The imagination could be subdued and brought under the power of the argument, if only the subject were "kept before the mind", and examples and illustrations of natural selection at work, particularly under domestication, were fully contemplated and allowed to govern and control thought on the subject. Darwin himself had proved that this could be done.

1 "The reliance upon the senses for evidence, not merely for illustration, is what constitutes the empirical character peculiar to modern science."
M.B. Foster, 'The Christian Doctrine of Creation and the Rise of Modern Natural Science', Mind XLIII, (1934), 465. There appears to be a strong Greek trait in Darwin's thought as T.H. Huxley himself suggested. (See chapter 6, p194).

2 Life and Letters of Chas. Darwin, Vol. II, 207

3 Ibid., 272

4 Ibid., 273

"I remember well the thought of the eye made me cold all over, but I have got over that stage of the complaint ..."¹

If the mind repeatedly entertained examples of organic change by successive small variations, the imagination could be made strong enough to leap over, or rather fill in, those gaps where intermediate steps between different types of organism had not been found, and where the untutored mind had difficulty in conceiving that they had ever existed. "If it could be demonstrated that any complex organ exists, which need not possibly have been formed by numerous, successive, slight modifications, my theory would absolutely break down. But I can find out no such cases," Darwin optimistically declared.² The power of imagination in analogical thinking is such that, when it is vivified and fashioned by successive examples and illustrations, it constrains the mind to think in only one direction.³ Darwin acknowledged that in many cases it is most difficult even to conjecture by what transitions organs have arrived at their present state, yet he is of the opinion that "all intermediate types must exist", and "when speaking about the evolution from the most simple eye to that of the highest vertebrates, he remarks that it is indispensable that 'reason should conquer the imagination.' The fundamental assumption is 'natura non facit saltum'. We see leaps in nature, but according to the doctrine of natural selection they cannot exist, consequently they do not exist."⁴

1 Life and Letters of Chas. Darwin, Vol. II, 296

2 Darwin appealed to the imagination in order to fill up these gaps. "Geological research, though it has added numerous species to existing and extinct genera ..., yet has done scarcely anything in breaking down the distinction between species, by connecting them together by numerous, fine, intermediate varieties; and this not having been effected, is probably the gravest and most obvious of all the many objections which may be urged against my views. Hence it will be worth while to sum up the foregoing remarks under an imaginary illustration ..." Charles Darwin, The Origin of Species (First edition), 255.

Thus the discussion of the imperfections of the geological record is ... an exercise in hypothetical, 'imaginary' reasoning.

3 "The human understanding, when it has once adopted an opinion (either as being the received opinion or as agreeable to itself) draws all things else to support and agree with it". Francis Bacon, Novum Organum, XLVI

4 R. Hooykaas, The Principle of Uniformity, 102

This power to conquer the imagination, given to the mind by the steady contemplation of facts, examples and illustrations of organic change by successive small steps, explains another feature that appears in Darwin's correspondence and his reflections upon this subject, and that is, that it results in a way of viewing the whole of nature, which logically cannot stop short of a universal understanding. In the argument from design, particularly as Kant expounded it, we observed that once you have acknowledged the principle of design in nature it leads on to the contemplation of the whole of nature and the universe under the category of design. There is no point at which the chain of analogical reasoning can be broken. Likewise, we find the same character attaching to the Darwinian argument of descent by natural selection. With Darwin it was all or nothing, and ultimately, he insisted, this view must extend to the whole of nature and the universe, it is arbitrary to draw a line and say that natural selection operates thus far and no farther. As Darwin put it in a letter to Lyell in 1859, "I am deeply convinced that it is absolutely necessary to go the whole vast length, or stick to the creation of each separate species." ¹ And again to J.D. Hooker, "But if you go any considerable length in the admission of modification, I can see no possible means of drawing the line and saying here you must stop." ² Writing a little later to Lyell, who had asked, "Must you not admit a primeval creative power which does not act with uniformity, or how could man supervene?" Darwin replies, "I entirely reject, as in my judgment quite unnecessary, any subsequent addition 'of new powers and attributes and forces', or any 'principle of improvement'... If I were convinced that I required such additions to the theory of natural selection, I would reject it as rubbish, but I have a firm faith in it ... I would give absolutely nothing for the theory of Natural Selection if it requires miraculous additions at any one stage of descent ... I think you will be driven to reject all or admit all". ³

1 Life and Letters of Chas. Darwin, Vol. II, 165 (See Appendix II of this thesis)

2 Ibid., 174

3 Ibid., 211 & 212

This result must, of course, inevitably follow if you extrapolate from fine gradations that are known to exist in organic nature to an infinite number of such gradations always and everywhere in the past even though they have not been found, or proved to have existed. Logically there is no point at which you can stop, and any halting-place must necessarily appear arbitrary. ¹ "It is funny", Darwin wrote to Lyell, "how each man draws his own imaginary line at which to halt. It reminds me so vividly what I was told about you when I first commenced geology - to believe a little, but on no account to believe all." ² And again to Thwaites, "I can see with my prejudiced eyes no limit to the perfection of the co-adaptations that could be effected by Natural Selection ... But I venture to repeat how pleased I am that you go some little way with me. I find that a number of naturalists do the same, and as their halting places are various, and I think arbitrary, I believe they will all go farther". ³

There appeared to be an inevitability about Darwin's theory, which meant that once you had conceded the principle, everything else must follow and no part of organic nature could be exempted from its rule. Charles Lyell expressed the feeling thus, "I have long seen most clearly that if any concession is made, all that you claim in your concluding pages of the Origin will follow. It is this which has made me so long hesitate, always feeling that the case of man and his races, and of other animals, and that of plants, is one and the same, and that if a 'vera causa' be admitted for one, instead of a purely unknown and imaginative one, such as the word 'creation', all the consequences must follow." ⁴

1 Lovejoy argues in The Great Chain of Being that the psychological value of the principle of continuity was that it made the world predictable, rational and secure. Thus below this level of the one perfect being a stoppage in the series of gradations of being, at one point rather than another, would be an act of caprice. "And the same is true of the continuum formarum; if nature 'made leaps' they must be groundless leaps; if there were gaps, or really missing links, in a sequence of existing forms, such that, for example, one kind of animal existed, but was separated from its most nearly similar actual species by a blank stretch of unrealized possibilities of intermediate kinds, the cosmos must be admitted to be lacking in orderliness, to be characterized by a kind of incoherency and whimsicality." A.O. Lovejoy, The Great Chain of Being, 329

2 Life and Letters of Chas. Darwin, Vol II, 286

³ More Letters of Chas. Darwin, Ed. Francis Darwin, Vol. I, 145

4 Life and Letters of Chas. Darwin, Vol. II, 206

There was then, in Darwin's view, no half-way house. 's he wrote to L. Jenyns, "People will have to reject all or admit all" ...¹ Once the principle is adopted and vivified under the influence of example and illustration the psychological constraints which operate to effect a change of view, which embraces ultimately the whole of nature, are very powerful indeed.²

This examination of the structure and character of Darwin's argument for universal evolution by natural selection provides us with a key which may help to explain the success of Darwin's views, despite the fact that he added little that was new in the way of factual evidence for the theory of descent.

II

We must distinguish here between the strictly scientific role of natural selection, where it is observed to operate in the modification of species and the production of varieties, and the wider extrapolation of the principle, by Darwin and his followers, to argue for, and explain, the descent of all living things from one or a few original forms. These different theories are sometimes referred to as micro- and macro-evolution respectively. Micro-evolution is not in dispute, it is what Darwin himself observed in domestic breeding, and what scientists have recognised as change and adaptation of creatures in the wild, such as melanism in moths. The supposed sufficiency of this same principle of natural selection to explain macro-evolution or the development of the whole organic world, is something which is now being seriously questioned from within science itself. Dr. Colin Patterson, senior biologist at the Natural History Museum in London, has expressed his misgivings in the following terms

There is no doubt at all that natural selection works - it's been repeatedly demonstrated by experiment. But the question of whether it produces new species is quite another matter. No one has ever produced a new species by means of natural selection, no one has ever got near it, and most of the current argument in neo-Darwinism is about this question of how species originate. It's there that natural selection seems to be fading out and chance events of one sort or another are being invoked. That is a very profound attack on neo-Darwinism.³

¹ Life and Letters of Chas. Darwin, Vol II, 264

² Of this tendency of the mind Bacon notes: "The human understanding is unquiet: it cannot stop or rest and still presses onward, but in vain. Therefore we cannot conceive of any end or limit to the world... The like subtlety arises touching the infinite divisibility of lines, from the same inability of thought to stop." Novum Organum, YLVIII

³ The Listener, 8 Oct., 1981

The structure and force of Darwin's argument in respect of macro-evolution was not so much scientific as metaphysical and psychological, evoking a particular view of the world which is fundamentally materialistic. It is clear from Darwin's early notebooks, which he began in 1837, that he had at that stage adopted a materialistic view. Notebooks 'M' and 'N', which were devoted to jottings in 'the moral sense and metaphysics', provide us with evidence of this. Unlike the notebooks B, C, D, and E on transmutation, they are marked 'private', for Darwin was conscious of the generally unacceptable nature of the observations they contained.

Darwin attributes the mental and moral constitution of man to material causes in his physical make-up. Thus, "Thought (or desires more properly) being hereditary is difficult to imagine it anything but structure of brain, hereditary, analogy points to this - love of the deity effect of organisation. Oh you materialist!"¹ He considers that man's mind and will can be explained in terms of his development from the brutes. If this could be grasped and understood it would afford a new approach to the subjects of man's rationality, morality, and religious consciousness. References to this are contained in a number of aphoristic remarks.

"Plato ... says in Phaedo that our 'imagery ideas' arise from the pre-existence of the soul, are not derivable from experience - read monkeys for preexistence."² Or again, "To study metaphysics, as they have always been studied, appears to me to be like puzzling at astronomy within mechanics - Experience shows the problem of the mind cannot be solved by attacking the citadel itself - the mind is function of the body - we must bring some stable foundation to argue from."³

The mind of man then, according to Darwin, is an epiphenomenon of the body. Our bodily organisation determines how and what we shall think and will. But in turn man's body is the product of the brute creation; he is descended from the monkey, the baboon, the ourang-outang, and so a true account of man's higher nature and reason must be given in terms of his affinity to, and derivation from,

1 Notebook 'C', 166, Darwin Collection, Cambridge University Library

2 Notebook 'M', 120

3 Notebook 'N', 12

these creatures "He who understands baboon", Darwin confided in his notebook, "would do more towards metaphysics than Locke." ¹ There was something half-mocking, derisory and misanthropic about the way in which Darwin used the words monkey, baboon and ourang-outang in relation to man, as if he was deliberately seeking to topple man's image and took a delight in such iconoclasm. "Man", he wrote in another place, "in his arrogance thinks himself a great work, worthy of the interposition of a deity - more humble and I believe true to consider him created from animals." ²

This reduction of man to the level of the animal creation led Darwin into scepticism regarding the validity and objective reality of man's moral experience and judgments, as well as his rationality. It made him consider that there was no such thing as free will. At the conclusion of a series of notes on the relationship between mind and bodily organisation he wrote, "... thinking over these things one doubts existence of free-will, every action determined by hereditary constitution, example of others, or teaching of others. (N.B. man much more affected by other fellow-animals than any other animal and perhaps the only one affected by knowledge which is not hereditary and instinctive) and therefore perhaps no free will - we may easily fancy there is, as we fancy there is such a thing as chance - chance governs the descent of a farthing, free-will determines our throwing it up - equal then the two statements." ³

In Darwin's estimation there was no such thing as chance, because he conceived of the whole world as bound ultimately by law. The extent and complexity of these laws of nature exceeded the comprehension of the human mind, and in our ignorance we spoke of chance events, when in fact all events were rigorously determined by the rule of law. As there was no such thing as chance, equally there was no such thing as free-will. What made a person decide? Was it not the thought that was uppermost at the time. But what caused that thought to be uppermost in the mind? Was it not accident, chance? Thus in the same notebook he wrote "I verily believe free-will or chance are synonymous ... Shake ten

1 Notebook 'M', 85

2 Notebook 'C', 196

3 Notebook 'M', 27

thousand grains of sand together and one will be uppermost - so in thoughts, one will rise according to law".¹

In just the same way as man's moral judgment and responsibility were a chimera - the epiphenomena of his bodily and, ultimately, animal constitution - so also were his religious convictions. They could no more be relied upon for objective knowledge of the Creator, than could man's moral consciousness for any absolute rule of right and wrong. Here again the Notebooks are an invaluable aid for this understanding of Darwin's early materialism.

We have already seen how he ventures to speculate that love of the deity might be the consequence of bodily organisation, as in his view everything else was. In a further note he takes this idea up and develops it, sketching in what he believes might be the origin of the idea of God. 'May not moral sense arise from our enlarged capacity for being ... guided on strong instruction sexual, parental and social instincts, giving rise 'do unto others as yourself', 'love thy neighbour as thyself' - analyse this out - bearing in mind many new relations for language - the social instinct ... fear for others acting in union ... action assistance and so on. May not idea of God arise from our confused idea of 'right' joined with necessary action of 'causation' in reference to this 'right' as well as the works of the whole world."²

Thus 'God' is simply the projection, or personification of moral necessity, and moral necessity is simply the instinctive constraint which has been bred into the individual over thousands of generations. Moral nature like phenomenal nature is subject to law and to posit a personal lawgiver or a personal creator is to make the same mistake as the savage who when it thunders says it is the will of God.

1 Notebook 'M', 30

2 Notebook 'M', 8.

But Darwin was not to escape so easily from the idea of a personal God, and the question of whether it was in man a priori or could be explained in the naturalistic manner he suggested. The problem was to haunt him to the end. In a letter written shortly after Darwin's death, by Julia Wedgewood, his sister-in-law, to Frank Darwin, Charles' son, in 1884, she refers to this ambivalence and uncertainty that seemed to characterize Darwin's state of mind on this fundamental question, and for which reason he preferred to regard himself as an agnostic rather than an atheist. ¹

The development of Darwin's materialistic philosophy, or world-view, was aided by the exercise of a powerful imagination. Imagination is the key to the explanation both of the development of Darwin's own ideas, and also the success with which he was able to communicate them to other people. "The heart", said Newman, "is commonly reached not through the reason, but through the imagination" ²

It is clear that from the moment Darwin began to keep his notebooks he had adopted the principles of a materialist philosophy. But from that time his imagination aided him in bringing everything he witnessed and observed under the control of these principles. His imagination enabled him to interpret facts, discern affinities, and pursue analogies in terms of the settled principles and ideas he had already accepted. It is interesting that not only his son Frank, in his personal reminiscence of his father, speaks of the 'richness of his imagination' ³, but many of Darwin's reviewers referred also to his powers in this direction. F.J. Pictet, whom Darwin regarded as one of the fairest of his reviewers, confessed when he read the Origin and had passed beyond the first few factual chapters that

his (Darwin's) imagination advanced more quickly than mine and drew conclusions from the accepted facts which seemed incompatible with these same facts. There seemed to me to be, as it were, a sort of disparity between his premises and his conclusion, the premises being so prudent, so just, so limited, and the conclusion on the contrary appearing so extremely speculative. ⁴

1 Darwin Collection, DAR 139¹²

2 J.H. Newman, Grammar of Assent, 92

3 Darwin Collection, DAR 140³

4 F.J. Pictet, "Sur L'Origine de L'Espèce par Charles Darwin", in Bibliothèque Universelle, VII (Geneva, 1860) iii, 234. Translation from D.L. Hull, Darwin and his Critics, 143

In the early notebooks we see the same tendency for Darwin's imagination to leap away from the facts and speculate freely over the whole range of phenomena. Under the power of this imagination the natural world, to use an expression of Darwin's, melts together and becomes one. What Darwin was doing by the gradual accumulation of illustrations and analogies was impressing upon himself and preparing to impress upon others the force of his ideas.

In his notebook Darwin reflects on the pleasure of imagination. It was a subject that greatly interested him, particularly how trains of thought and ideas (he calls them 'castles' in his notebooks) arose in different people's minds. An agriculturalist, or he a geologist, would view a scene differently and this would give rise to different reflections. He saw here a connection with poetry and recalled that Wordsworth had said something about science being sufficiently habitual to become poetical. Specially significant are Darwin's words when he wrote, "I am sure I remember my pleasure in Kensington Gardens has often been greatly excited by looking at trees as great compound animals united by wonderful and mysterious manner." ^{1, 2}

Here we see the power of imagination to present reality under a wholly new and unexpected aspect. It would be the orientation of his mind and train of thoughts as a naturalist which would enable him to view the scene in Kensington Gardens in this way. Here we have a most vivid illustration of the way Darwin's mind worked, and the manner in which he was able to see affinities and resemblances of an unusual nature thus bringing the phenomena he observed under a quite different perspective. This is what modern philosophers have called, using the German expression, ein Blick, (a look, glance, glimpse, view, appearance).

1 Notebook 'M', 41

2 A parallel example of the power of the imagination under the influence of one dominating idea is found in Kilvert's Diary. The editor, William Flomer, describes it thus. "His (Kilvert's) susceptibility to all feminine beauty ... seems to increase ... In his middle thirties he is in a state of almost continual bewitchment and emotional upheaval; he endows natural phenomena with feminine personalities, seeing flowers for instance as pure penitent maidens and a couple of trees as 'twin sisters' who 'kiss each other in the dusk' ... Kilvert's Dairy, Vol II, Ed. by William Flomer, 1939. 'Continual bewitchment' with the idea of evolution could well describe the state of Darwin's mind from 1837 onwards.

It is not in the nature of a conclusion drawn from premises, not an induction from facts. It is not strictly an inference at all, but a qualitative leap of the imagination from a train of thoughts thus evoking a new view of reality. This was the character of Darwin's thought from the beginning, and it remained so throughout in his non-scientific works such as The Origin and the Descent of Man.

The notebooks reveal the power of Darwin's imagination to blend together the minds and bodies of man, animals, plants - the whole organic creation in one all-embracing view. A good example of the way in which his mind moved quickly from one idea to another, to give the original thought extended and eventually universal application, is to be found in Notebook 'M', "With respect to free will, seeing a puppy dog playing cannot doubt that they have free-will, if so all animals, then an oyster has, a polype (and a plant in some senses, perhaps, though from not having pain and pleasure actions unavoidable and only to be changed by habits) now free-will of oyster, one can fancy to be such effect of organization by the capacities its senses give it of pain or pleasure, if so free-will is to mind what chance is to matter." ¹

Everywhere, all about him, Darwin was seeing affinities, examples, illustrations, which clothed the bare principles of his materialist philosophy and gave it a vividness and force which impressed itself more and more upon his mind. Newman, in the Grammar of Assent, argues that 'notional assents', that is the formal acceptance of bare propositions, become 'real assents' when those propositions, or principles are given concrete expression and illustration. ² Real assent depends upon the intensity of the impression made upon the imagination. He also goes on to show how once the imagination is captured in this way the strength of the impression rules out an alternative way of viewing or explaining things. It is a development of this kind that we witness in the notes of Darwin during this period 1837-39.

¹ Notebook 'M', 72

² J.H. Newman, Grammar of Assent, 81

In his walks in the Zoological Gardens he was impressed with the affinities between the sexuality of men and baboons. "Hunt, (the intelligent Keeper) remarked that he had never seen any of the American Monkeys show any desire for women - a very green monkey (from Senegal he thinks, Callitux Sebe ?) he has seen place its head downwards to look up women's petticoats, just like Jenny with Tommy ourang - very curious. The monkeys understand the affinities of man, better than the boasted philosopher himself." ¹

Or again, "We need not feel so much surprise at male animals smelling vagina of females - when it is recollected that smell of ones own fundament - not disagreeable" ²

But he saw remarkable similarities and likenesses in the whole range of animal and human behaviour. The difference between children and young pigs noticeably diminished as he reflected on the subject: "Children have an uncommon pleasure in hiding themselves and skulking about in shrubbery, when other people are about. This is analogous to young pigs hiding themselves: hereditary remains of savage state". ³ So did the difference between tastes of animals and man: "The tastes of man same as in the allied Kingdoms - food, smell (ourang-outang) music, colours we must suppose, Pea-hen admires peacock's tail, as much as we do - touch apparently, ourang-outang very fond of soft silk-handkerchief - cats and dogs fond of slight tickling sensation - in savages other tastes are few" ⁴ Taking this thought a step further he writes: "There is scarcely a faculty in man not met with in the lower animals - hence the general aim of fables, and expressions are cunningness of fox, industry of bee, etc. etc." ⁵

1 Notebook 'M', 138 Darwin Collection

2 Notebook 'M', 85

3 Notebook 'N', 66

4 Notebook 'N', 64

5 Notebook 'N', 69

Even the reason of man, his knowledge and his science, present no insuperable obstacle to Darwin's agile mind and questing imagination. Was there not after all a gradation that could be perceived even here? "We see gradation to man's mind in Vertebrate Kingdom, in man's 'instincts', in rodents then in other animals and again man's mind, in different races being unequally developed ..."¹

A little further on he reflects, "the different intellect of man and animals not so great as between living thing without thought (plants) and living thing with thought (animal)"²

The possession of Science and knowledge by man did not create an unbridgeable gulf between the mind of man and the minds of animals, because it could be considered that animals already possessed these things in a rudimentary sense. He had observed at the zoological gardens how the male Black Swan was very fierce when the female was sitting, and the keeper was obliged to go in with a stick, "... if he drops it the bird will fly at him - knowledge." This is followed by another note "Sept. 13th. It will be good to give Abercrombie definition of 'reason' and 'reasoning' and take instance of dray horse going down hill (argue sophism of association Kenyon) and then go on to show that if cart horse argued from this into theory of friction and gravity - it would be similar 'reason' or reasoning' - only other more steps - dispute about words -"³ "All science", he concludes, "is reason acting systematically on principles, which even animals practically know ..."^{4,5} Our interest here is not in whether Darwin was right or wrong in his speculations, but in seeing the scope and intensity of his imagination.

1 Notebook 'C', 196 2 Notebook 'C', 214 3 Notebook 'M', 141 4 Notebook 'N'

5 J.S. Mill, in his Logic, argued that animals are capable of induction.¹¹¹ But William Whewell thought this a misuse of the term. He considered that it should be retained for conscious inference. Only the conscious application of a law is induction. If I act upon the law without thinking about it, or if, for example, a billiard player produces a certain result without thinking about it, this is not induction at all in the proper sense of the term.

Some may dismiss this as a verbal quibble, but "such questions of definition are never questions of definition merely. A proposition is always implied along with definition; and the truth of the proposition depends upon the settlement of the definition." Of Induction with Special Reference to Mr. J.S. Mill's System of Logic, Wm. Whewell, London, 1849. 12

Yet despite the confidence with which Darwin, in imagination, related one aspect of nature to another, and made man himself an integral part of the whole scheme, (so that he could write "I agree with Leyll. Man is not an intruder ... Man acts and is acted on by the organic and inorganic agents of this earth like every other animal"),¹ he still recognised and experienced certain difficulties in conceiving just how certain developments could have possibly come about. Here and there he felt he could shrug such difficulties off, or answer them by posing other difficulties. "Having proved mens' and brutes' bodies are one type almost superfluous to consider minds - as difference between mind of a dog and a porpoise was not thoroughly overwhelming - yet I will not shirk difficulty - I have felt some difficulty in conceiving how inhabitant of Tierra del Fuego is to be converted into civilized man² - ask the missionaries about Australian, yet slow progress has done so - show savage a dog and ask him how wolf was so changed."³

However, not all the difficulties for his evolutionary view could be answered in this way. There were, he was forced to recognise, limits to what even his imagination could encompass. For example, how was it possible to conceive of the development of such a complex organ as the eye from nothing? Might it not be wise, therefore, to limit the scope of his theory? "In my speculations must not go back to first stock of all animals, but merely to classes where types exist for if so it will be necessary to show how the first eye is formed - how one nerve became sensitive to light."⁴

1 Notebook 'E', 65

2 It would appear that Victorian sensibility was sometimes more shocked by the suggestion of an affinity between European man and the primitive savage than between man and the brute creation. Thus Archbishop Whately wrote to Adam Sedgwick regarding The Origin, "I felt alarm at the apparent high favour and wide celebrity of Darwin's theory (wh. I suppose is Lamarck's cooked up afresh) because it was likely to establish our descent from Molluscs or Insects ... But my proper position is, the improbability of the last step of all - the advance of the savage-man into the civilized, without external help.

I doubt the conversion of oats into Rye: their conversion into apple-trees I disbelieve: but what I have undertaken to disprove is the conversion of the unaided savage into civilized man". Archbishop Whately to Professor A. Sedgwick, 13 Feb. 1860, Samuel Butler Papers, British Library EG.3020A

3 Notebook 'E', 47

4 Notebook 'D', 21

Again there were times when the whole theory seemed to appear in a rather unreal light. Such moments of doubt could never be completely excluded and there were times, even in his later life after he had fully developed his theory with the aid of the principle of Natural Selection, when he felt uncertainty and experienced flashes of unbelief. While the imagination can bring about a new orientation of the mind towards reality, there are times when concentration lapses and the alternative view of nature, as deliberately designed and created, obtrudes into the picture. He described one such experience at the end of notebook 'E'. "It seems absurd proposition, that every budding tree and every buzzing insect and grazing animal owes its form to that form being the one alone out of innumerable other ones which has been preserved." But then he immediately counters this faltering of the mind with an appeal to analogy with generation. "But he it remembered how little part of the grand mystery is this - the law of growth, that which changes the acorn into the oak - In short all which, nutrition, growth and reproduction, is common to all living beings." ¹

This last note is important in two respects. First, it shows us the strength of the alternative 'explanation' or understanding of the universe in terms of design. Though that understanding may be suppressed by the power of the imagination evoking a different view of the world, yet there are still times when it comes back with a primitive force and compelling power. To take just one example of this in Darwin's later experience towards the end of his life: The Duke of Argyll is supposed to have said to Darwin, (in the course of a conversation about Darwin's works on the 'Fertilization of Orchids', 'Earthworms' and various other observations he had made of the wonderful contrivances for certain purposes in nature) that it was impossible to look at these without seeing that they were the effect and expression of mind. "I shall never forget Mr. Darwin's answer," the Duke afterwards related. "He looked at me very hard and said, 'Well, that often comes over me with overwhelming force; but at other times,' and he shook his head, vaguely adding, 'it seems to go away'" ²

¹ Notebook 'E', 145

² Life and Letters of Chas. Darwin, Vol I, 316

Secondly, it reveals that the 'Blick', or 'world view' that is evoked by the kind of argument that Darwin had employed must be sustained, especially when it is threatened or challenged, by the reinforcement of the imagination with further examples and analogies in just the way that Darwin does it in this note. This shows that it is not an inference drawn from premises, for in order to sustain the inference one would not need to be continually checking the logic of the argument. That, if done correctly in the first instance, is inviolable. But here if the 'conclusion' is threatened it has to be revived and strengthened by analogies and instances which do not bear the relation of premises to an inference, but have a quite different, cumulative effect upon the imagination.

However, despite occasional doubts and misgivings Darwin was sufficiently persuaded of the validity and impressed with the scope of the world-view which he had illustrated so prolifically in the notebooks. He thought the traditional view of creation very poor and inadequate in comparison. "What a magnificent view one can take of the world", he wrote. "Astronomical causes, modified by unknown ones cause changes in geography and changes in climate, and climate super-added to change of climate from physical causes - then super-added changes of form in the organic world, as adaptation and those changes affect each other and their bodies by certain laws of harmony keep perfect in this themselves - instincts alter, reason is formed and the world peopled with myriads of distinct forms. This is a period short of eternity to the present time, to the future - How far grander this idea from cramped imagination that God created (warring against those very laws he established in all organic nature) the Rhinoceros of Java and Sumatra ... he has made a long succession of vile mollusca animals. How beneath the dignity of him who is supposed to have said let there be light and there was light." ¹

¹ Notebook 'D', 36

Darwin had arrived at a 'world-view', basically materialistic,¹ which he regarded as superior in its scope and application to the traditional view of creation, which was much too circumscribed for him, ("Has the Creator since the Cambrian formation gone on creating animals with the same general structure - miserable, limited view -").² He had convinced himself of this, but would he be able to convince others? What was there to make his evolutionary speculations, his affinities and analogies between the animal world and man differ from the speculations of Lamarck and the author of the Vestiges, neither of which had done much previously to convince the scientific world of the superiority of this understanding of organic nature? Nothing, it would appear, except the principle of natural selection, the discovery of which he chanced upon in October 1838 while in the middle of his speculations in his notebooks. Natural selection or the survival of the fittest which, as Darwin himself agreed is the more accurate and less misleading term, is in any case a truism. "No amount of argument will alter the fact," says H.G. Cannon, "that the survival of the fittest by means of natural selection is a truism. The expression 'survival of the fittest' is tautological ... and moreover the whole idea is not the property of Darwin ... (he) has no more right to claim the idea of the survival of the fittest as (his) own than any particular mathematician can lay claim to the elementary problems of Euclid - or to the idea that the shortest distance between two points is a straight line!"³ H.F. Osborne has pointed to the obvious appreciation of the power of Natural Selection which Tennyson shows in his In Memoriam,

1 Dean Farrar, in Darwin's funeral service in Westminster Abbey, said, "This man, on whom for years bigotry and ignorance poured out their scorn, has been called a materialist. I do not see in all his writings one trace of materialism. I read in every line the healthy, noble, well-balanced wonder of a spirit profoundly reverent, kindled into deepest admiration for the works of God." Quoted by R.M. Young in 'The Impact ^{of Darwin} on Conventional Thought', in The Victorian Crisis of Faith, Ed. Anthony Symondson, 26.

2 Notebook 'C', 216

3 H. Graham Cannon, Lamarck and Modern Genetics, 71 & 72

the dedication of which precedes the Origin by ten years. When taxed about this the aged Tennyson replied, "The fact is that long before Darwin's work appeared these ideas were known and talked about." ^{1,2} But more than this, when in the late 1860's the principle of Natural Selection as the sole means of evolution was widely discredited, we find, paradoxically, that the general theory of evolution survived nevertheless. This is something that calls for explanation. Our next section will be an attempt to show how this was possible.

III

Darwin considered that his theory was distinguished by, and differentiated from, the theories of his predecessors, particularly the speculations of the author of the Vestiges, and what he called 'the nonsense of Lamarck', by the principle of natural selection. He believed that in this he had discovered the vera causa of the change of one species into another. The weakness of all earlier theories of evolution, it was assumed, and the reason for their failure to enlist the support of scientific men, was that they gave no reasonable, or convincing account of how the transmutation of species might have come about. They were altogether too speculative. Lamarck had postulated a 'sentiment intérieur' which responded to the changed needs and conditions of the organism, and so effected a transformation of it to fit its new environment. This was popularly misunderstood to mean evolution according to the wish, or whim, of the animal and was consequently ridiculed. Darwin himself dismissed it as nonsense, but without realizing that he had already adopted some of the ideas of Lamarck, and later, as he revised the Origin, came to adopt even more. The author of the Vestiges supposed that

1 H.F. Osborn, From the Greeks to Darwin, 1894

2 Thirty years earlier William Buckland had amused his students in his lectures at Oxford by asserting that the stomach dominates everything in nature, and that the law of nature is "Eat or be eaten". Hannah Gordon, The Life and Correspondence of William Buckland (1894), 31

Even earlier Lamarck had outlined the struggle for survival thus: "Animals except those which are herbivorous, prey upon one another; and the herbivorous are exposed to the attacks of the flesh eating races. The stronger and best armed for attack eat the weaker, and the greater kinds eat the smaller."

Phil. Zool. tom. i, 113. Quoted by Samuel Butler, Evolution, Old and New, 282

evolution came about through 'saltation', by the generation of the organism producing prodigious leaps between itself, its own structure and that of its offspring. This, too, was unacceptable, because there was no proof of such leaps and the theory seemed too speculative and lacking in inductive foundation. The appeal and the success of Darwinism lay in its appearing to fill this gap, and provide a mechanism for change which was at once both plausible and ostensibly possessing an inductive character. Darwin insisted that the basis of change was slight variation in the organism. The evidence for this was to be found in domestic animals. The means of change was the selection of animals possessing variations that were profitable and their accumulation in successive generations. In domestic breeding the selection was done by man; in nature it was done by competition with other animals for food and the struggle with the elements which ensured that only the fittest and the best adapted to the conditions of life survived. It was this new element in Darwin's theory that commended it to scientific men, though not all scientific men, and enabled the notion of evolution to gain general acceptance where formally it had failed for lack of cogency. Yet when the argument which Darwin had employed became arguably both incoherent and contradictory, the conclusion lived on in the public mind. When natural selection, as Darwin had first put it forward in The Origin, became discredited as the sole means of transmutation of organisms, and Darwin himself had to retract his earlier statements about it, nevertheless the general theory of evolution itself did not suffer.¹

There are three strands in the argument which reveals this development.

First there are the attacks of Darwin's critics upon the principle of natural selection. The doctrine of natural selection came under sustained attack from the time The Origin appeared until the early 1870's when Darwin eventually withdrew from controversy into purely scientific observation and writing.

¹ "I have always frankly admitted ... the inestimable benefit which he (Darwin) has conferred upon us by teaching us to believe in evolution - though maintaining that he has led us to believe in it on grounds which I for my own part cannot accept ... As for 'natural selection' frankly to me it now seems a rope of sand as in any way accounting for the 'origin of species.'" Samuel Butler to Francis Darwin, Nov. 25, 1877, Darwin Correspondence, (68) British Library.

When Darwin's work on Insectivorous Plants appeared in 1875 Wallace wrote to him in some surprise,

"You do not make any remarks on the origin of these extraordinary contrivances for capturing insects. Did you think they were too obvious? I daresay there is no difficulty, but I feel sure they will be seized on as inexplicable by Natural Selection, and your silence on the point will be held to show that you consider them so!" ¹

Darwin's retirement from controversy about natural selection followed hard upon the energetic attack of St. George Mivart, which he conducted both in his book Genesis of Species (1871) and also in his review of the Descent of Man in the Quarterly Review (1871). In the latter Mivart draws attention to several places in the Descent of Man where Darwin contradicts his earlier statements about natural selection. Darwin admits that he "probably attributed too much to the action of natural selection ...", that he had not sufficiently taken into account structures which are neither injurious nor beneficial and which cannot, therefore, be explained by any form of selection. Such admissions, if true, Mivart maintained, are fatal to Darwin's theory, for "the assignment of the law of 'natural selection' to a subordinate position is virtually an abandonment of the Darwinian theory: for the one distinguishing feature of that theory was the all sufficiency of 'natural selection'" ²

But the criticism and pressure upon Darwin to change his theory and qualify his position on natural selection had been there all along, ever since the publication of The Origin, and the formidable attack of Mivart, which Darwin felt himself incapable of answering, was only the coup de grâce. Earlier, in 1868, Darwin wrote to J.D. Hooker "I am glad you are going to touch on the statement that belief in natural selection is passing away. I do not suppose that even the 'Athenaeum' would pretend that the belief on the common descent of species is passing away, and this is the more important point. This now almost universal belief in evolution (somehow) of species, I think may be fairly attributed in a large part to the Origin..." ³

¹ Peter Vorzimmer, Chas. Darwin, The Years of Controversy, 254

² Quarterly Review, Vol. 131 (July & Oct. 1871), 48

³ Life and Letters of Chas. Darwin, Vol. II, 304

This letter reveals how the conclusion may be detached from the argument, and yet be considered to survive. It illustrates the paradox that the theory of evolution, which required the principle of natural selection to make it appear cogent and viable to the scientific community, and to bring about its public acceptance, could nevertheless live on when the basis of its recognition had been destroyed. Evolution is now, in Darwin's own words, brought about "somehow". But that was how things stood in relation to the theory of evolution before Darwin came on the scene. And such a position was then regarded as unsatisfactory by most naturalists, including Darwin himself. The justification for the Origin had been that it was supposed to have shown how evolution had come about.

Such a conclusion [that evolution had taken place] even if well founded, would be unsatisfactory, until it could be shown how the innumerable species inhabiting this world have been modified, so as to acquire that perfection. 1

What then was the real role of the principle of natural selection if it could be dispensed with in this way? What was the service it performed for the theory of evolution? The answer to this is provided in a chance remark of Francis Darwin's in his introduction to More Letters of Chas. Darwin. There he stated that it was impossible to read the 1837 notebooks without feeling that Darwin was convinced of the mutability of species. However, 'he had not yet attained to a clear idea of natural selection, and therefore his views may not have had, even to himself, the irresistible convincing power they afterwards gained." 2 The service natural selection performed was to aid Darwin's imagination and give it an even greater compelling power both for himself and others, than it already possessed. An illustration may help to bring out this point. In the notebooks Darwin considers that this theory must stop short of the descent of all species from one common stock, otherwise he would have to explain the origin of the eye. This seemed too great a leap for his imagination

1 Charles Darwin, The Origin of Species (Sixth Edition), 2

2 More Letters of Chas. Darwin, Vol. I, 38

at that stage. But in due course he overcame it; and he achieved this with the aid of the principle of natural selection, which helped him to imagine what was before unimaginable, ¹ i.e. the building up of a primitive eye spot into the complex organ of the eye by small favourable variations accumulated over millions of years. The latter argument seems to be no less speculative than the former, but the difference was that it was more amenable to the imagination and therefore easier to accept. The tenability of Darwin's theory seemed to be governed by what could be imagined as true or possible. ² Thus in answer to W.H. Harvey who asked him whether his four or five original forms were created as eggs or seed, or as full grown? He wrote, "You hit me hard and fairly ... yet I still have an illogical sort of feeling that there is less difficulty in imagining the creation of an asexual cell, increasing by simple division." ³

1 Natural selection was employed as an instrument for converting improbabilities into facts. It was this that William Whewell objected to in The Origin. "First, it is assumed, that the mere possibility of imagining a series of steps of transition from one condition of organs to another, is to be accepted as a reason for believing that such transition has taken place: And next, that such a possibility being thus imagined, we may assume an unlimited number of generations for the transition to take place in, and that this indefinite time may extinguish all doubt that the transitions really have taken place". W. Whewell, Astronomy and General Physics, pp. xvii-xviii.

"The demonstration [of specific transformation by the accumulation of small changes in structure] can be modified without difficulty to fit any conceivable case. It is without scientific value, since it cannot be verified; but since the imagination has free rein, it is easy to convey the impression that a concrete example of real transmutation has been given." Prof. W.R. Thompson. Introduction to The Origin of Species, Everyman Edition 1956, No. 811.

2 It would appear that Darwin attached such importance to the imagination that he considered the mere possibility of imagining circumstances under which a belief or theory might be regarded as true, as tending to confirm or establish those views. Thus there is the strange reference in his Autobiography to the truth of Christianity considered in this way. He says that he disliked giving up his belief (in Christianity) and tried to imagine evidence which would convince him again of the truth of the Gospels as, for example, the discovery of new manuscripts at Pompeii or elsewhere. "But I found it more and more difficult with free scope given to my imagination, to invent evidence which would suffice to convince me." Life of Darwin, Vol. I, 309.

3 More Letters of Chas. Darwin, Vol. I, 163

Secondly, Vorzimmer has argued, in a well documented book, that the successive revisions of the Origin brought about its decline into incoherence and contradiction. He concludes,

None of the many modifications which Darwin had ... made in the Origin gave it the internal consistency it so sorely needed. Rather than changes, he saw his replies to criticism as clarifications and expansions upon his original views. Yet, in almost every case, his finding support for one weakened argument had, in effect, entailed his removing part of the support from another.

By confusing the causes of variation with the causes of speciation; by totally rejecting saltative changes thereby committing himself completely to individual differences; by committing himself to speciation without (apparent) isolation; by tacitly and (often) credulously assuming the heritability of certain forms of variation; in all by a gradual and cumulative series of changes without full awareness of their implications, Darwin made the later Origin a mass of 'doubts, shifts of opinion, confused words, hedging, self-contradictions, endless shufflings with words, indecisiveness, hesitations, inconsistencies'. 1

Yet despite all this, the conclusion outlived the argument. But if we rightly understand the nature of Darwin's argument we can see how this came about. It was not in its wider scope a scientific argument. Had it been, the theory, or hypothesis of evolution, could not have survived the disasters that overtook it. It was rather an imaginative whole; it resembled in fact, the form and structure of the design argument, and was indeed its antithesis. By a series of analogies and illustrations it acquired a cumulative force the impetus of which was capable of effecting 'ein Blick', - a wholly new orientation of the mind upon reality. The psychological effect of such an argument may be likened to the pressure exerted gradually upon a large uneven stone lying upon the ground. The stone is moved gradually by the force exerted upon it, until it reaches a point at which it suddenly rolls over to rest upon a new surface, and there it remains even when the pressure is removed ... So the steady, cumulative effect of this type of argument eventually effects a new orientation - and there it remains, like the stone on its new facet - the conclusion is capable of living on even when the 'argument' which brought it about has lost its cogency. In this respect Darwin wrote with some foresight and perspicacity about his argument to Hugh Falconer, Oct. 1st, 1862 "... far from being surprised, I look at it as absolutely certain that very much in the Origin will be proved rubbish; but I expect and hope that the framework will stand." 2

1 Peter Vorzimmer, Chas. Darwin, The Years of Controversy, 225 & 226

2 More Letters of Chas. Darwin, Vol. I, 209

W.F. Cannon, writing in the foreword to Vorzimmer's book states,

The original Origin was not very logical, not all rigorous. Darwin was writing to convince, not to prove. He was trying to get across his own complex vision of how the world operates; and he seized upon any metaphors, any analogies, any line of argument that he had on hand ... his vision was an imaginative whole, tampering with it only made it more prosaic. ¹

This helps to explain why Darwin's theory of evolution could survive detailed criticism, and the inept attempts which he made to revise the argument for it. It could not have survived had it been strictly a scientific argument.

The third strand in our argument also casts some further light on the matter. Earlier in this chapter we noted A.O. Lovejoy's contention that Darwin had largely left the theory of evolution where he had found it, that is, that all the principal arguments that were employed by Darwin and Huxley after 1859 to commend the theory had been known and employed at least fifteen years earlier by the author of the Vestiges.

Lovejoy, however, having stated his case, leaves us with a riddle. How could the theory of evolution, so firmly rejected by the world in 1845, under those circumstances receive recognition and acceptance after 1859? If the logical status of the argument had not changed what accounted for its later success? The only explanation would appear to be in terms of the imaginative appeal and cumulative force of Darwin's argument. The crudities and baldness of the Vestiges position were overcome by the 'new element', natural selection, which presupposed all the steps to be infinitesimally small. Such gradualism, as we have already seen, greatly aided the imagination in conquering the difficulties of the stages of evolution, and conceiving the possibility of what before was unimaginable. It helped to overcome the residual resistance to the notion, and when this had been accomplished in the popular imagination, even though the principle of natural selection as the sole means of transmutation of species fell into disrepute, and became unintelligible in the face of criticism, the conclusion lived on.

¹ Peter Vorzimmer, Chas. Darwin, The Years of Controversy, xiv

The arguments from palaeontology, morphology, etc., which before had been rejected, now appeared to have a place in the popular advocacy of evolution, and a cogency which they had formerly lacked. Huxley, who twenty years before could not accept them, employed them with great zeal and energy.

Chauncey Wright, the American mathematician, who came to Darwin's defence against Mivart, nevertheless had to admit the odd appearance of Darwin's argument and what had subsequently happened to it.

It is, at first sight, a paradox that the views most peculiar to the eminent naturalist, whose work has been chiefly instrumental in effecting this change of opinion, should still be rejected, or regarded with suspicion, by those who have nevertheless been led by him to adopt the general hypothesis, - an hypothesis which his explanations have done so much to render credible. It would seem at first sight that Mr. Darwin has won a victory, not for himself, but for Lamarck. Transmutation, it would seem, has been accepted, but natural selection, its explanation, is still rejected by many converts to the general theory, both on religious and scientific grounds. ¹

"Opinions," he concluded, "are contagious, even where their reasons are resisted." He might also have added, 'conclusions' survive even when the 'arguments' that led up to them are rejected, forgotten, or misunderstood. It is the special character of those mental processes that lead to this position that we are concerned with, and we have noted that the general theory of evolution, Darwin's 'conclusion', outlived the demise of the principle of natural selection, the growing incoherence of Darwin's argument, and the extraordinary fact that the logical status of the argument for evolution was in principle the same before as after Darwin.

IV

Here we must notice something else which throws light upon the character of Darwin's argument, and that is its closeness to, and affinity with, ideological thought. An ideology is a means of coping intellectually with reality, with life and the world. It is a way of making sense of things, a way of interpreting reality, and an attitude towards it which is internally and subjectively coherent but does not necessarily have any objective validity, and indeed in principle can never be shown to possess it because it can never be satisfactorily proved or checked against the facts it purports to interpret.

¹ Chauncey Wright, North American Review, July 1871

There are two things that must be noted about ideological thought. First, there is a lack of logical precision in the terms that are used. This was true of Darwin's use of the term 'natural selection'. He maintained that 'survival of the fittest' was more accurate and meant the same thing, yet insisted on using the former to the confusion of himself and his readers. He acknowledged that it was not a cause of modification, but only a means, yet continued to speak of it as if it were an efficient cause. He considers in one place that the conditions of life include natural selection, and in another that natural selection fully embraces the conditions of existence. He frequently makes natural selection synonymous with evolution, or descent with modification.¹

Secondly, there is a consequent re-interpretation of the facts to fit the theory. In ideological thinking no fact is allowed to count against the theory. The facts are 'redefined', as it were, to agree with it. One who thinks ideologically cannot lose because his answer, his interpretation, and his attitude have been derived from the ideology and are not subject to the facts. There is no possible argument, observation, or experiment that could disprove a firm ideological belief. If we take, for example, the classical Liberal economist, how do you prove to him that his laissez faire equations do not always hold? No matter how many exceptions you may point to he will always explain that there has been an 'interference' from a monopoly, a government, a physical accident, or a trade union coercion.

There is a parallel between this kind of ideological thinking and Darwin's argument for evolution by means of natural selection. Fleeming Jenkin, in the North British Review of 1867 drew attention to the elusive nature of the evolutionary theory presented by Darwin.

1 Even A.R. Wallace, in a letter to Darwin, dated 2 July 1866 complains about the misunderstanding that the term 'natural selection' gives rise to, especially because of the imprecision with which Darwin uses it, and suggests that he drop it altogether, and use 'the survival of the fittest' instead. This Darwin refused to do. More Letters of Chas. Darwin, Vol I, 267 & 268.

Another argument against the efficiency of natural selection is, that animals possess many peculiarities the special advantage of which it is almost impossible to conceive; such for instance, as the colour of plumage never displayed; and the argument may be extended by pointing out how impossible it is to conceive that the wonderful minutiae of say, a peacock's tail, with every little frond of every feather differently barred, could have been elaborated by the minute and careful inspection of rival gallants, or admiring wives (sexual selection); but although arguments of this kind are probably correct, they admit of less absolute demonstration than the points already put. A true believer in natural selection can always reply, 'You do not know how closely Mrs Peahen inspects her husband's toilet, or you cannot be absolutely certain that under some unknown circumstances that insignificant feather was really important,' or finally, he may take refuge in the word correlation, and say, other parts were useful which by the law of correlation could not exist without these parts; and although he may not have one single reason to allege in favour of any of these statements, he may safely defy us to prove the negative, that they are not true. The very same difficulty arises when a disbeliever tries to point out the difficulty of believing that some odd habit or complicated organ can have been useful before fully developed. The believer who is at liberty to invent any imaginary circumstances, will very generally be able to conceive some series of transmutations answering his wants. 1

Jenkin was right to use the terms 'believer' and 'unbeliever', for they are more appropriate to this case than any other. 2 An attitude towards reality has been taken up in advance; no fact or observation is allowed to count against it; and when apparent discrepancies are raised the process of reinterpretation and accommodation is invoked endlessly. Jenkin goes on,

"He [the believer in evolution by natural selection] can invent trains of ancestors of whose existence there is no evidence; he can marshall hosts of equally imaginary foes; he can call up continents, floods, and peculiar atmospheres, he can dry up oceans, split islands and parcel out eternity at will; surely with these advantages he must be a dull fellow if he cannot scheme some series of animals and circumstances explaining our assumed difficulty quite naturally. Feeling the difficulty of dealing with adversaries who command so huge a domain of fancy, we will abandon these arguments; and trust to those which at least cannot be assailed by mere efforts of imagination." 3

1 North British Review Vol. XLVI, (1867), 293

2 William Hopkins wrote of The Origin, "Our author makes very little use of the verb 'to prove' in any of its inflexions. His formula is, 'I am convinced,' 'I believe', and not 'I have proved'. We are not finding fault with these more modest forms of expression; but we may be allowed, perhaps, to remark, that they are the formula of a creed and not of a scientific theory."
Frazer's Magazine, Vol. LXII, (July 1860), 80 & 87 (my italics).

3 North British Review, Vol. XLVI, (1867), 293.

The whole argument, however, had the same character. There was no point at which it could be firmly held down to factual or logical criticism. It partook of the same character as ideological thinking. Jenkin imagined that in raising the question of a limit to the action of natural selection he was appealing to observation and experience. Darwin himself acknowledged that there appeared to be a limit to what could be accomplished by domestic selection and breeding, but his answer to Jenkin's criticism was characteristic. How do we know that when this limit has been reached the organism does not remain at that stage for a very long time before fresh variations appear which take it beyond the limit? Can we affirm absolutely a limit, and if not what objection can we make to imagining that it might be surpassed?

An ideology has the quality of being practically shock-proof. Its usefulness is determined not by its conformity to fact, but by its facility in making reality amenable and tractable to the mental and moral condition of that section of humanity who adopt it. An ideology is discarded not when it ceases to conform to the facts, for such a situation can never arise - the possibilities of its accommodation and reinterpretation can never be exhausted - but when it ceases to be useful, and is replaced by some other interpretation of the world. In other words, when it ceases to meet an inner psychic need of mankind rather than when it is shown to be inconsistent with the facts of the case.

V

Darwin regarded his concluding remarks of the second volume of "Variation in Animals and Plants under Domestication" as the best account and summary of his position on the question of teleology, and he thought, on the whole, unanswered. It is worth, therefore, quoting it here in extenso.

If an architect were to rear a noble and commodious edifice, without the use of cut stone, by selecting from the fragments at the base of a precipice wedge-formed stones for his arches, elongated stones for his lintels, and flat stones for his roof, we should regard him as the paramount power. Now the fragments of stone, though indispensable to the architect, bear to the edifice built by him the same relation which the fluctuating variations of organic beings bear to the varied and admirable structures ultimately acquired by their modified descendents.

Some authors have declared that natural selection (the architect) explains nothing, unless the precise cause of each slight individual difference be made clear. If it were explained to a savage utterly ignorant of the art of building, how the edifice had been raised stone upon stone, and why wedge-formed fragments were used for the arches, flat stones for the roof &c.; and if the use of each part and of the whole building were pointed out, it would be unreasonable if he declared that nothing had been made clear to him, because the precise cause of the shape of each fragment could not be told. But this is a nearly parallel case with the objection that selection explains nothing, because we know not the cause of each individual difference to the structure of each being.

The shape of the fragments of stone at the base of a precipice may be called accidental, but this is not strictly correct; for the shape of each depends on a long sequence of events, all obeying natural laws; on the nature of the rock, on lines of deposition or cleavage, on the form of the mountain, which depends on its upheaval and subsequent denudation, and last on the storm or earthquake which throws down the fragments. But in regard to the use to which the fragments may be put, their shape may be strictly said to be accidental. And here we are led to face a great difficulty, in alluding to which I am aware that I am travelling beyond my proper province. An omniscient Creator must have foreseen every consequence which results from the laws imposed by Him. But can it reasonably be maintained that the Creator intentionally ordered, if we use the words in the ordinary sense, that certain fragments of rock should assume certain shapes so that the builder might erect his edifice? If the various laws which have determined the shape of each fragment were not predetermined for the builder's sake, can it be maintained with any greater probability that He specially ordained for the sake of the breeder each of the innumerable variations in any domestic animals and plants; - many of these variations being of no service to man, and not beneficial, far more often injurious to the creatures themselves? Did He ordain that the crop and tail feathers of the pigeon should vary in order that the fancier might make his grotesque pouter and fantail breeds? Did he cause the frame and mental qualities of the dog to vary in order that a breed might be formed of indomitable ferocity, with jaws fitted to pin down the bull for man's brutal sport? But if we give up the principle in one case - if we do not admit that variations of the primeval dog were intentionally guided in order that the greyhound, for instance, that perfect image of symmetry and vigour, might be formed, - no shadow of reason can be assigned for the belief that variations alike in nature and the result of the same grand laws, which have been the groundwork through natural selection of the formation of the most perfectly adapted animals in the world, man included, were intentionally and specially guided. However much we may wish it, we can hardly follow Professor Asa Gray in his belief "that variation has been led along certain beneficial lines", like a stream "along definite and useful lines of irrigation". If we assume that each particular variation was from the beginning of all time pre-ordained, then that plasticity of organisation, which leads to many injurious deviations of structure, as well as the redundant power of reproduction which inevitably leads to a struggle for existence, and, as a consequence, to the natural selection in the survival of the fittest, must appear as superfluous laws of nature. On the other hand, an omnipotent and omniscient Creator ordains everything and foresees everything. Thus we are brought face to face with a difficulty as insoluble as is that of free will and predestination. 1

1 Charles Darwin, Variation in Animals and Plants under Domestication, 524 -526

It is clear from this passage that in Darwin's view, even if there were a Deity capable of foreseeing all events, yet He could not be regarded as intentionally ordering them for that would make natural selection superfluous. In other words, what we have here is a fundamental clash between Darwin's system and a teleological interpretation of the world. These constitute two mutually exclusive attitudes to reality which cannot be reconciled at the metaphysical level, and that was why Darwin could never concede any place at all to design in his system. The notion of chance or random variation was basic to his belief. R. Hooykaas has written, "In spite of his waverings and hesitations and agnosticism there is some kind of metaphysics behind his dislike of design and miracle, a dislike which goes deeper than would be warranted by mere methodology."¹ Many of Darwin's contemporaries, including those who adopted the role of apologists for his views assumed that evolution by natural selection could be reconciled with some understanding of Providential guidance, or at least was not exclusive of a teleological account of creation. T.H. Huxley was amongst those who adopted this position. In his essay on the 'Reception of the Origin' in Life and Letters of Charles Darwin, he argued against those who asserted that Darwin had reinstated chance and banished teleology from the world. Darwin, he said, did not appeal to chance but to an unknown cause, yet cause there is, as the fundamental assumption of science is that every event has a cause; the universe is governed by law. Therefore the present state of the world can be attributed to the working out of natural laws, and an omniscient being could have predicted from the nebulous, primeval cosmic vapour, what shape and form the fauna of Britain would have in 1869. Darwin he maintained had not banished teleology, but only driven it further back to the molecular structure of the universe. The teleological and mechanical views of nature are not, necessarily, mutually exclusive. ²

1 R. Hooykaas, The Principle of Uniformity, 174

2 T.H. Huxley, in Life and Letters of Chas. Darwin, Vol. II, p.202
(appeared first in 'The Genealogy of Animals', The Academy, 1869)

But this is precisely the view that Darwin considered and rejected. An omniscient being may foresee, but does not necessarily foreordain; if he does foreordain then the principle of the Darwinian system is rendered superfluous. Thus the deity in Darwin's account is no more than a passive spectator of that for which he is not himself responsible - a sort of universalisation and deification of the helplessness and impotency of the individual in face of the enigma of the universe. Huxley's apology may have been evoked by the desire to make Darwin's philosophy respectable to the mid-Victorian mind, and to appeal to the desire prevalent in the late 'sixties, to have a doctrine of evolution which was planned or directed,^{1,2} but it did nothing, in fact, to reconcile teleology with natural selection.

Lyell and Asa Gray both tried in their different ways to find a place for teleology within the Darwinian doctrine of evolution. Asa Gray, a naturalist and practising American Presbyterian, was reluctant to think that Darwin's theory entailed a rejection of design. In his articles in the Atlantic Monthly in which he reviewed the Origin, he canvassed the possibility that Darwin was, after all, a theist, and that his theory was not incompatible with a teleological interpretation of organic nature. Here he employed the metaphor to which Darwin referred in his final chapter of Animals and Plants.

... we should advise Mr. Darwin to assume, in the philosophy of his hypothesis, that variation has been led along certain beneficial lines. Streams flowing over a sloping plain by gravitation (here the counterpart of natural selection) may have worn their actual channels as they flowed; yet their particular causes may have been assigned; and where we see them forming definite lines of irrigation, after a manner unaccountable in the laws of gravitation and dynamics we should believe that the distribution was designed. 3

1 A. Ellegaard, Darwin and the General Reader, 32 & 123 ff.

2 For example, F.W. Hutton wanted directed evolution and failed to understand Darwin's antagonism to it. "The greatest objection, it seems to us, which can be brought against the theory [Darwin's] is its reliance on natural causes and chance in effecting the changes. We should be more inclined to refer the modifications which species of animals or plants have undergone to the direct will of God ... " The Geologist (1860), 3 : 471

3 Asa Gray, Darwiniana, 122

Though Darwin had a great respect for Gray, and had had a correspondence with him from before the publication of The Origin, he found this interpretation of his position quite unacceptable. He confessed himself to be in a muddle, but not sufficiently muddled to see that Gray's account of evolution and design would not agree with his own. He wrote to Gray, Nov., 26th, 1860

I grieve to say that I cannot honestly go as far as you do about design ... To take a crucial example, you lead me to infer (p.44) that you believe that variation has been led along certain beneficial lines. I cannot believe this; and I think you would have to believe that the tail of the Fantail was led to vary in the number and direction of its feathers in order to gratify the caprice of a few men. Yet if the Fantail had been a wild bird, and had used its abnormal tail for some specific end, as to sail before the wind, unlike other birds, every one would have said, 'What a beautiful and designed adaptation'. Again, I say I am, and shall ever remain, in a hopeless muddle. 1

When later Gray asked Darwin what would convince him of design, he answered,

If I saw an angel come down to teach us good, and I was convinced from others seeing him that I was not mad, I should believe in design. If I could be convinced thoroughly that life and mind was in an unknown way a function of other imponderable force, I should be convinced. If man was made of brass or iron and no way connected with any other organism which had ever lived I should perhaps be convinced. But this is childish writing. 2

It is interesting to notice that Darwin concedes that in principle he would be convinced by a miracle or discontinuity in the chain of events. Only such a divine interposition he considered could evidence design. Yet as we have seen the rationale of Darwin's whole system was to exclude a priori the possibility of such an interposition. The rules were so constructed as to preclude it by definition. Analogy with contemporary experience is the ground for judging all that has happened in the past. The extremely small gradations witnessed in domestic selection, and selected in nature by the survival of the fittest, are extrapolated to explain the existence of every living thing, and where gaps exist, according to this principle, they can and must be filled in by the imagination. 3

1 Life and Letters of Chas. Darwin, Vol II, 353-354

2 Ibid., 377

3 "If you agree with me in thinking such an interposition of the Deity uncalled for, I can see no reason whatever for believing in such interposition in the case of natural beings, in which strange and admirable peculiarities have been naturally selected for the creature's own benefit... For the life of me I cannot see any difficulty in natural selection producing the most exquisite structure, if such structure can be arrived at by gradation, and I know from experience how hard it is to name any structure towards which at least some gradations are not known." Darwin to Lyell, 1860, Life and Letters of Chas.

But this only serves to point up again the difference between Darwin and his apologists. A teleological explanation was impossible for Darwin because it was irreconcilable with his world view, which was metaphysical rather than scientific.

It is certain that Darwin viewed design as a threat to his theory. A single instance, if proved, would "annihilate my theory", "It would be absolutely fatal to my theory."¹ That was because the distinguishing feature of his system, which commended the notion of organic evolution where his predecessors Lamarck and Chambers had failed, was 'natural selection'. Natural selection must have not only small, but also random variations upon which to work. If the variations were not in all directions, good and bad, so that the struggle for existence could 'select' those that were favourable, Darwin's theory would have nothing to distinguish it from directed evolution or saltative evolution, where the adaptation of the organism to its environment must ultimately be attributed to a supreme intelligence, and not to the mere accidental operation of the laws of nature. Anything, therefore, which threatened the basic principle of natural selection, threatened the whole ideological view of the world which rested upon it. It is not surprising that Darwin was extremely sensitive on this point and would not accept the efforts of his friends and well-wishers to effect a reconciliation between teleology and his theory. The notion of chance was essential to his system. Von Baer, the German embryologist, saw the centrality of this concept to Darwinism, when he wrote

Apparently Darwinism has triumphed precisely because it denies purposes in nature and because it insists on explaining the appearance of purposiveness in nature by blind forces producing a host of life forms and the elimination of the less fit by natural selection. ²

¹ Charles Darwin, The Origin of Species, 150

² From Augsburger Allgemeine Zeitung (1873), no. 130, 1986 - 1988
Translation by D.L. Hull.

Any attempt, therefore, to remove chance from the system and replace it with purpose was hostile to the whole rationale of Darwin's theory. Darwin's response to all these attempts to wean him away from his position was to return to his belief that variations are random. Perhaps one of the clearest expressions of this and his rejection of such an overture is in a letter to Lyell about the time of his correspondence with Gray.

... I believe you think, with Asa Gray, that I have not allowed enough for the stream of variation having been guided by a higher power. I have lately had a good deal of correspondence on this head. Herschel in his Physical Geography has a sentence with respect to the Origin, something to the effect that the higher law of Providential arrangement should always be stated. But astronomers do not state that God directs the course of each comet and planet. The view that each variation has been providentially arranged seems to me to make Natural Selection entirely superfluous, and indeed takes the whole case of the appearance of new species out of the range of science. But what makes me most object to Asa Gray's view is the study of the extreme variability of domestic animals. He who does not suppose that each variation in the pigeon was providentially caused, by accumulating which variations, man made a Fantail, cannot, I think, logically argue that the tail of the woodpecker was formed by variations providentially ordained. It seems to me that variations in the domestic and wild conditions are due to unknown causes, and are without purpose and in so far accidental; and that they become purposeful only when they are selected by man for his pleasure, or by what we call Natural Selection in the struggle for life, and under changing conditions. I do not wish to say that God did not foresee everything which would ensue; but here comes very nearly the same sought of wretched imbroglio as between free will and preordained necessity. I doubt whether I have made what I think clear; but certainly A. Gray's notion of the course of variation having been led like a stream of water by gravity seems to me to smash the whole affair ... 1

The rejection of design was not, then, arbitrary or incidental to Darwin's theory. It was essential to it, and to the view of the world which he was seeking to evoke by his argument. Design represented the totality of the opposing view and could not at any point be admitted. Few of Darwin's contemporaries seemed to appreciate his concern about this, and thereby failed to grasp his true position. The attempt to conflate the two positions, by affirming that ultimately everything that happened was caused, was in Darwin's view "mere verbiage".

T.V. Wollaston considered that Darwin preferred to run the risk of being shipwrecked bodily on the rocks of Scylla [chance], than run the slightest risk from the opposite Charybdis [design].²

1 More Letters of Chas. Darwin, Vol I, 191 & 192

2 D.L. Hull, Darwin & His Critics, 134

VI

We have still to give some account of Darwin's muddled state of mind, to which he frequently confessed, and this would appear to be best explained in terms of the conflict between the two world views. Darwin's advocacy of the naturalistic world view had in his own mind effectively conquered the other concept of creation by design but had not totally eliminated it. Evidence for this is to be seen in the way in which he often referred in his letters to an 'inner consciousness' which points in the direction of a supreme intelligence responsible for the fashion of the world and the adaptation of organic life to it. In the midst of his correspondence with Gray, when he has been firmly rejecting any notion of design, or providentially guided variation, he wrote,

If anything is designed, certainly man must be; one's 'inner consciousness' (though a false guide) tells one so. I cannot believe that man's rudimentary mammae ... were designed. If I was to say I believed this, I should believe it in the same incredible manner as the orthodox believe in the Trinity in Unity ... 1

We have seen how in the early notebooks, in the materialistic philosophy developed there, Darwin tended to reject the notion that the innate idea of God in the human consciousness was something directly implanted. He considered that it had grown up in the human mind as it had developed from an animal state. But the idea continued to haunt him and he seemed incapable of expunging it entirely from his consciousness. Throughout his life he remained unsure how much weight to give it, over against the picture of the world and human life that he had developed. Thus, we find him writing to F.E. Abbot, the editor of a freethinking paper in Boston, who had greatly admired Darwin's work, and enlisted him as a patron,

My views [on religion] are far from clear, as you will readily perceive, if you read the last page in my Variation of Animals and Plants under Domestication. And I can never make up my mind how far our [this important word is unclear in the original] an inward conviction that there must be some Creator or First Cause is really trustworthy evidence. 2

1 Life and Letters of Chas. Darwin, Vol. II, 382

2 Darwin Collection 139/12 (written September 6th, 1871)

This fits exactly with the testimony of Julia Wedgewood regarding the religious views of Darwin, which she wrote down for Francis Darwin when he was preparing a life of his father. She states that from his books one would conclude a complete neutrality on religious questions.

This is what everybody would say. But what I feel is that in looking back at the impression left on me by intercourse, it is rather different. Every one, I suppose, who feels Religion infinitely the most important subject of human attention would be aware of a certain hostility towards it in his attitude, so far as it was revealed in private life. And that is to me very remarkable; I should say that it was a growing hostility while all the apparent reasons for it were vanishing qualities.

[i.e. Churchmen were tending to adopt an evolutionary view]. I think I partly see why this was the case. I remember, of course dimly in some sense, but very vividly in others, a conversation more than 30 years ago, certainly long before the publication of the Origin in which he first told me a little of the scope of the book, (this would be in the early 1850's) so far as that it was a scheme of what is now called Evolution - so far at least as that it was an alternative to the ideas we then all held of the beginning of this world by an act of Creation. And I recall my own expression of extreme repugnance to this idea and the sense of loss in giving up the belief in Creation. I hardly remember a single distinct word in the conversation, but just his last words, 'I cannot conceive any wish about the matter one way or another', are so clear to me as if they had been spoken yesterday, at least both the meaning and the tone of voice and the look comes back to me now though perhaps the words may not be exactly literal. He felt he was confronting some influence that adulterated the evidence of fact. And I think he felt this all the more because he was not so entirely without it himself as he thought. When he sat down to write he was entirely without it. But perhaps all the more a little of it - I mean of the spirit that mingles wish with belief - crept into his attitude to other things, and it became something he recognised as a disturbing influence, or at least that he was insensibly aware of in that light. And it seems to me that as Religion came nearer to him he saw this more clearly.

I am sure there was nothing in his mind hostile to the idea of a creative will. Indeed almost the last words he said to me were what I took to be such an expression of this belief, at least of a tendency towards it. It was one day when I was standing in the dining room, and he came up quite abruptly and began without any preface, in a way as if the subject had been much in his mind - 'The reason that I can never give in to the belief that we are all naturally inclined to, of a first cause,' he did not say a personal first cause, but he gave me the impression of meaning that, 'is that I look upon all human feeling as traceable to some germ in the animals', and then he went on to tell me why this seemed to him to conflict with the other. 1

This throws some light upon the inner conflict that Darwin experienced which accounts for his state of mind on this fundamental question, and the consequent shifts and uncertainties. The naturalistic position he had taken up dictated that he exclude the notion of design in the universe, and the concomitant of a supreme creative intelligence. But while his mind and his imagination moved

in that direction, his 'inner consciousness' still asserted the possibility of a first cause - a personal first cause - responsible for the order and design of the world and man himself. But the horns of the dilemma upon which he was impaled were: What significance could he attach to such 'inner consciousness' when the mind and nature of man had derived by mere chance, as it were, from the mind and nature of animals ? ¹ The very nature of this spiritual conflict, however, and the lateness of its manifestation, are proof of the persistence and strength of this a priori conception of God and the opposing view of nature which it represented. All Darwin's energies and the persistent bent of his mind and imagination had been directed to establishing an alien view of the world. Yet the notion of God and design refused to be totally obliterated.

1 "... I cannot put much or any faith in the so-called intuitions of the human mind, which have been developed, as I cannot doubt, from such a mind as animals possess; and what would their convictions or intuitions be worth ... ?"

Darwin to Lord Farrer, August 1881, More Letters of Chas. Darwin, Vol. I, 395

THE DESIGN ARGUMENT AFTER DARWIN:
ATTEMPTS TO REINSTATE THE ARGUMENT
AND TO RECONCILE IT WITH DARWINISM.

I

The success of the theory of evolution, as advocated by Darwin in The Origin, represented a profound trauma for Natural Theology and, in particular, the Argument from Design. The history of the argument from that time has been one of attempts to come to terms with the problems posed by natural selection and the theory of descent, and it has never enjoyed the same prominence and popularity that it enjoyed in the pre-Darwinian era. Then it was an effective weapon in the armoury of Christian apologetic, but since that time it has been regarded as something which itself needs defending. The process of readjustment and the attempts to reconcile design and evolution have taken many different forms. The force of Darwin's argument, as we have seen, was to exclude teleology, for if the path of evolution had been directed by some supreme intelligence then the necessity for natural selection would disappear. Yet it was natural selection which was the new element which Darwin had introduced into his argument to make evolution creditable. On this point Darwin refused to give way, for he saw that he was dealing with two mutually exclusive principles.

There were, however, those, like Asa Gray, who were unwilling to believe that this was the case, and cherished the belief that Darwin did not really reject design, and that his theory was not ultimately exclusive of it.

Gray considered that there are two ways of bringing about a reconciliation between Darwin and design. In the first place he considered that intellectual, or teleological, and mechanical views of nature were not repugnant. The traditional way of regarding organisms was as ultimate facts, to be interpreted theologically and viewed in relation to the Divine mind. It tended to be assumed that what was unexplained scientifically was also inexplicable.

The Darwinian approach was to consider organic phenomena as resolvable under investigation and to seek to explain them as attributable to natural causes. "But does the one," Gray asks, "really exclude the other? Does the investigation of physical causes stand opposed to the theological view, and the study of the harmonies between mind and nature? More than this, is it not most presumable that an intellectual conception realized in Nature would be realized through natural agencies?"¹ The ultimate why of natural creation, which naturalists have tended to attribute to the Divine mind, is not necessarily in conflict with the proximate how. It is the latter that Darwin had undertaken to investigate. "He conceives of a physical connection between allied species; but we suppose he does not deny their intellectual connection as related to a supreme intelligence. Certainly we see no reason why he should, and many reasons why he should not?"²

Within the evolutionary process itself, assuming the hypothesis to be true, there are evidences which would appear to point to design. Some account has to be given of the emergence of sterility, between species. Darwin had not been able to explain this fact. But whether it is original or derived, Gray argued, an arrangement of this nature,

to keep apart those forms which have, or have acquired (as the case may be), a certain moderate amount of difference, looks to us as much designed for the purpose, as does a ratchet to prevent reverse motion in a wheel. If species have originated by divergence this keeps them apart.³

A most formidable difficulty for the Darwinian theory, Gray considered, was the necessity of explaining the production and specialization of organs. Wherever Darwin attempted to do this he reminded Gray of Lamarck, and showed how little advance had been made in this subject in the course of a century.

Here purely natural explanations fail. The organs being given, natural selection may account for some improvement; if given a variety of sorts or grades, natural selection might determine which should survive and where it should prevail.⁴

1 Asa Gray, Essays and Reviews pertaining to Darwinism, p.17

2 Ibid., p.18

3 Ibid., p.41

4 Ibid., p.42

The best the theory of evolution can do here is to make the most of gradation and adherence to type, as suggestive of derivation, and unaccountable on any other scientific view, but the attempt to explain how such a development might come about is altogether too conjectural and unsatisfactory. "As to why it is so, the philosophy of efficient cause, and even the whole argument from design, would stand, upon the admission of such a theory of derivation, precisely where they stood without it," and Gray concludes with the pious hope that "Mr. Darwin, in proposing a theory which suggests a how that harmonizes these facts into a system, we trust implies that all was done wisely, in the highest sense designedly, and by an intelligent first cause." ¹

The second way in which Gray sought to reconcile Darwin and teleology was by availing himself of the loophole which Darwin had left in The Origin when he had referred to the commencement of life on this planet. There he left open the possibility that the Creator had breathed life into a few forms or one. ²

If this were the case then we are confronted with design in the original organic form, whatever that might have been. What, therefore, was to hinder Paley's argument being given a further a fortiori extension. Paley had himself allowed that generation did nothing to invalidate his argument, but rather enhanced it. Watches which were so constructed that they could produce other watches like themselves were even greater marvels of design than non-productive watches. Let us suppose then that the watches are made in such a way as to produce "better watches, and contrivances adapted to successive conditions, and so at length turns out a chronometer, a town clock, or a series of organisms of the same type" ³. God can take account of all contingencies from the beginning and make allowance for them. The whole developing plan of evolution is before him and contemporaneous with the Divine mind.

1 Asa Gray, Essays and Reviews pertaining to Darwinism, p.43

2 Darwin's actual words at the close of The Origin were, "There is a grandeur in this view of life, with its several powers having been originally breathed by the Creator into a few forms or into one ... " Origin (Sixth ed.) The difference between this and the first ed. is that 'by the Creator' has been added. (p. 403)

3 Asa Gray, Essays and Reviews, etc., 46

Gray, however, recognised that it was not sufficient to reconcile design with evolution. The nettle of natural selection had to be grasped if the public were to be convinced that Darwinism was not incompatible with theism and teleology. Hence Gray's ingenious attempt to compare descent by natural selection with the course of a river which follows the natural terrain but may be considered as directed by the contours along which it flows. The Creator may, therefore, be thought of as providing the clue for evolution to find its way through the labyrinth of natural selection from its earliest beginning to its final outcome in man. 1

The attempts of Gray and other theistic evolutionists to find room for design alongside the Darwinian theory highlights the difference between their position and that of pre-Darwinian teleologists. The latter had appealed confidently to design in nature as evidence for the existence of a supreme creative intelligence. The latter could do no more than appeal for a hearing for design as a possible interpretation of a theory that was at best indifferent and at worst inhospitable to such a view.

II

It is significant that not merely theists like Gray were concerned about the reinstatement of teleology after Darwin. Samuel Butler was of the opinion that Darwin, with his theory of natural selection, had banished design from nature. This, he thought, was unwarrantable and mounted a strong attack upon Darwin in Evolution, Old and New. He considered that the frivolities of learned commentators on Paley, in the decades prior to Darwin, had done harm and set up a reaction against teleology. But the concept of design was fundamental to our understanding of nature and could not easily be dismissed.

The idea of design - or perception by an intelligent living being, of ends to be obtained and of the means of obtaining them - and the idea of the tendons of the foot and the ligament which binds them down, come together so forcibly, that no matter how strongly Professors Haeckel and Clifford and Mr. Darwin may try to separate them, they are no sooner pulled asunder that they straightway fly together again of themselves. 2

1 A writer in MacMillan's Magazine put it picturesquely, "The infinitude of small deviations from the parent type ... may be regarded as a labyrinth laid out by the hand of the Creator, through which he furnishes a clue to a higher state of being, in the principle which rewards every step in the right direction." (1861), 241 The metaphor of the labyrinth is reminiscent of Asa Gray's illustration.

2 Samuel Butler, Evolution, Old and New. 23

Darwin and his followers had denied design, as having any appreciable share in the formation of organisms at all. Paley and the theologians insisted on design, but upon a designer outside the universe and the organism. The third view, which Butler advocated, was that which he believed was held by Buffon, improved by Dr. Erasmus Darwin, and borrowed from him by Lamarck, that is, that the designer which has designed organisms, resided within, and has been embodied in the organisms themselves.¹ Life, according to Butler, is its own designer "... it is more consistent with reason and the common use of words to see the designer of each living form in the living form itself, than to look for its designer in some other place or person."²

In a letter dated November 25, 1877 to Francis Darwin Butler says that, while he had at first accepted Darwin's arguments about natural selection, when he came to read Mivart's criticisms he at once felt something more was needed to give an aim to variations. This led him to adopt a Lamarckian position, because Lamarck's theory of evolution was not incompatible "with a teleological point of view," and was "only different from Paley's in so far as the designer with Paley is from without, and with Lamarck from within."³ This Lamarckian idea of evolution being directed from within the organism, has been revived in recent years by Sir Alistair Hardy who has argued that animal consciousness may be regarded as a factor which operates in natural selection and the evolutionary process. Consciousness modifies the behaviour of the animal and motivates exploratory actions. If these are successful they lead to an advantage of that animal over its competitors and to increased survival. Such a view, Hardy argues, affects our understanding of Darwinian evolution. If mind and consciousness are a factor in the direction of evolution it is no longer the materialist creed it was formerly considered to be. These views are in many respects similar to Butler's.⁴

1 Samuel Butler, Evolution, Old and New, 31

2 Ibid., 30 & 31

3 Darwin Correspondence, British Library, 68.

4 See Sir Alistair Hardy, The Biology of God, 53 ff.

Thus we see that the loss of a teleological view, which the Darwinian position appeared to entail, was felt not only by traditional and orthodox theists who had a particular apologetic axe to grind, but by others too, who nevertheless felt the need for an aim and purpose behind evolution.

As Ellegaard points out, in Darwin and the General Reader, while the public at this time were prepared to accept a doctrine of evolution, they were not prepared to accept one which excluded teleology.¹ The most popular position was that of directed selection and derivation, a position which paid homage to both science and religion. The Duke of Argyll based his argument for design in nature upon three interrelated points; the universal intuitive perception by men of the working of mind in nature which he termed 'anthropopsychism'; the difficulty even sceptical scientists found in avoiding teleological language in describing nature; and the testimony in common language itself to a purpose in nature revealed by unconscious metaphors and expressions which spoke of design. From this he argued for a view of evolution as directed. He inclined to a position not dissimilar to that of the Vestiges which he described as 'development' and in which he saw the whole of nature unfolding according to a predetermined plan. The view of evolution for which people hankered was, paradoxically, that of the Vestiges.

The general public was preparing to assimilate evolutionism, but it was a pre-Darwinian evolutionism, where Design figured as if Darwin had never propounded the Natural Selection theory. 2

Even on the part of Darwin's supporters there seemed a reluctance to accept that his theory was incompatible with design in the wider sense, or at least there appeared to be a willingness to concede to those who wished for a teleological interpretation of nature, that such a view was not irreconcilable with the doctrine of The Origin. We have noted, in passing, Huxley's apologia in this respect. He saw Darwin as reviving the thought and philosophy of Greece,

1 A. Ellegaard, Darwin and the General Reader, 32

2 Ibid., 126

and enthroning evolution in place of the credulity and superstition that had held sway for seventy generations, that is, the Christian era.¹ He deals with certain theological and philosophical difficulties that this entails. Darwin, he says, did not appeal to chance variation but to spontaneous variation, the cause of which we are ignorant of, but the basic belief of the scientist is that all is governed by law and order not chance. Teleology is, therefore, simply placed further back in the molecular structure of the world instead of in its organic forms.

The teleology which supposes that the eye, such as we see it in man, or one of the higher vertebrata, was made with the precise structure it exhibits, for the purpose of enabling the animal which possesses it to see, has undoubtedly received its death blow. Nevertheless, it is necessary to remember that there is a wider teleology which is not touched by the doctrine of Evolution.

This wider teleology lies in the original molecular structure of the universe and the definite laws governing it. This basic, primitive plan contains everything living and not living that has developed from it in the course of time. Thus

The telological and the mechanical views of nature are not, necessarily, mutually exclusive. On the contrary, the more purely a mechanist the speculator is, the more firmly does he assume a primordial molecular arrangement of which all the phenomena of the universe are the consequences, and the more completely is he thereby at the mercy of the teleologist, who can always defy him to disprove that this primordial molecular arrangement was not intended to evolve the phenomena of the universe. 2

There is no reason to think that Huxley was not sincere in his attempt to salvage teleology at this point, and that this represented his personal point of view on the subject, but attending it may also have been the desire to make evolution palatable to a public which was reluctant to accept such a theory, divorced from the concept of design. Huxley even went on to appeal to Paley, whose influence even then was not dead. That "acute champion of Teleology ...

1 Huxley claimed that Darwin was returning, after 2000 years, to classical Greek thought in introducing the notion of evolution rather than the Hebrew concept of creation.

2 Life and Letters of Chas. Darwin, Vol. II, p. 201; 201-202

saw no difficulty in admitting that the 'production of things' may be the result of trains of mechanical dispositions fixed beforehand by intelligent appointment and kept in action by a power at the centre ... that is to say, he proleptically accepted the modern doctrine of Evolution; and his successors might do well to follow their leader, or at any rate to attend to his weighty reasonings, before rushing into an antagonism which has no reasonable foundation."¹

It is not, however, possible to accept the bona fide of all those who at this period expressed a desire to bring together the new evolutionism and teleology. J.D. Hooker declared at a meeting of the British Association in 1866 that he saw evidence for design in variation itself: "By a wise ordinance it is ruled, that amongst living beings like shall never produce its exact like ... A wise ordinance it is, that ensures the succession of being, not by multiplying absolutely identical forms, but by varying these." However, he soon afterwards assured Darwin that he had not really meant it.

The only thing I do not like ... was the passage about a wise Providence ordering &c., &c., or something of that sort (I forget the words, it matters little). It is bosh and unscientific, but I could not resist the opportunity of turning the tables of Providence over those who will have a Providence in the affair, that yours is the God one and theirs the Devil's. 2

III

Darwin's own position with regard to the wider teleology was ambivalent. While he set his face against design in the organism, there are many expressions in The Origin which suggest that he entertained some notion of a purpose for life and the world which was subserved by evolution. The chapter on the struggle for existence is softened by the opinion that it makes ultimately for the happiness of the many: "When we reflect on this struggle, we may console ourselves with the full belief, that the war of nature is not incessant, that no fear is felt, that death is generally prompt, and that the vigorous, the healthy,

¹ Life and Letters of Chas. Darwin, Vol. II, p 202

² Life and Letters of J.D. Hooker, Vol. II, 106

and the happy survive and multiply".¹ There is the suggestion that the development of life on this planet has been, and is, watched over and superintended by some power that seeks its continual improvement: "We must suppose that there is a power, represented by natural selection, or the survival of the fittest, always intently watching each slight alteration ... and carefully preserving each ... Natural selection will pick out with unerring skill each improvement."² He closes The Origin on a note of optimism, which sums up the drift of many such isolated passages in the book. As Darwin looks back at the development of living things on the earth from earliest times, and from, perhaps, one or a few forms he writes, "We may feel certain that the ordinary succession by generation has never once been broken, and that no cataclysm has desolated the whole world. Hence we may look with some confidence to a secure future of great length. And as natural selection works solely by and for the good of each being, all corporeal and mental endowments will tend to progress towards perfection."³ Why should Darwin have chosen to sum up his theory in this way, and embody so fully in these words the doctrine of the inevitable progress of the human race as the crown of evolutionary development? There was nothing in his theory per se to compel him to think in this way. Natural selection meant that the organism fitted into its environment, nothing more and nothing less, not that life must give rise to more complex and higher forms, judged to be so from an anthropocentric point of view. Perfection, if it is to be considered in this context, can only mean the fit of the organism with its conditions of life, not its place in the scale of human evaluation of such an attribute. Natural selection could mean stagnation or retrogression. It was not necessarily true that evolution in Darwin's sense had any purpose at all. It is, therefore, surprising to find him concluding The Origin with this strongly optimistic note that is reminiscent of a wider teleology.⁴ Did he take this line because

1 Charles Darwin, The Origin of Species, 57. 2 Ibid., 146 3 Ibid., 402

4 In The Descent of Man, the note of optimism about man's future is even more pronounced. "Man", Darwin said, "may be excused for feeling some pride at having risen, though not through his own exertions, to the very summit of the organic scale; and the fact of his having thus risen may give him hopes for a still higher destiny in the distant future." The Descent of Man, Vol II, 405 Natural selection, in fact, offered the prospect of man being superseded by some superior species.

he felt it would commend his theory to a public who would otherwise reject it ? Was he unconsciously influenced by the ethos of Victorian thought generally, and the teleological evolution of the Vestiges and Lamarck, indeed, of Hegel and Spencer ? Or was he himself persuaded that life, and in particular human life, and the world, must have some ultimate purpose, and cannot finally be interpreted apart from such a goal ?

It is probable that all these motives were present, either consciously or unconsciously, in the presentation of his theory. He was jealous of his reputation as a scientist, and was anxious about how his theory would be received both by fellow scientists and by the public. Fear of the outcome and of offending religious susceptibilities were, it would seem, the principal reasons for the inordinate delay in the publication of his views. He was most sensitive to praise or blame, and, as his granddaughter Nora Barlow states, he 'craved for approbation', A note of optimism and purpose, such as he sounded in The Origin, and which chimed in with the prevailing mood of mid-Victorian spirituality, was not therefore without its value in commending the doctrine of evolution by natural selection to the public, despite the fact that natural selection itself was no basis for such conjecture.

It is also probable that Darwin was unconsciously influenced by the evolutionary optimism that was in the air. The conviction had been growing in the nineteenth century that progress, and in particular the progressive development of mankind, was guaranteed by the laws of nature. Lyell as early as 1827, in his first defence of uniformitarian geology, had spoken of man's 'capability of progressive improvement' and affirmed that this 'progressive power is infinitely enhanced by perceiving what an unlimited field of future observations is unfolded to us by geology, and by its various kindred sciences".¹

1 Quoted by R.M. Young, The Impact of Darwin on Conventional Thought, 27

Such views were considerably reinforced by the time Spencer published his essay in Progress: Its Law and Cause, in 1857, two years before the appearance of The Origin. In his essay Spencer argued that the progress which he observed in nature was "not an accident, not a thing within human control, but a beneficent necessity".¹ It would be surprising if Darwin were untouched by such ideas which had gained wide acceptance. His own theory of natural selection did not give rise directly to this sort of speculation, but since it was a theory of evolution it was capable of benefitting from the evolutionary optimism that prevailed.

Behind all this there may also have been a residual Deism. Darwin was brought up in Unitarianism. When he speaks, as he often did in his notebooks and The Origin, of a view of nature which is worthy of the Deity, he clearly has in mind a God who is remote and detached from the world, certainly not the God of the Old or New Testaments. Darwin had been amused at his grandfather's jibe that Unitarianism was a feather-bed to catch a falling Christian.² It is doubtful in later life whether he consciously subscribed even to this tenuous creed, but there would have been sufficient of the purposiveness attaching to such a belief remaining from his early years to influence his thoughts about evolution in The Origin, and give them the colour of a wider teleology and optimism than could be found solely in the doctrine of natural selection.

Here Darwin found himself on the horns of a dilemma. He could not easily throw over a belief in purpose for man and the universe, yet he could not regard them except as the products of chance. Sometimes he wanted to affirm a purpose for the whole cosmos, but the particular grounds for this inference were lacking, or rather denied, by the theory of natural selection. He expressed his difficulty thus to Asa Gray, "I see no necessity in the belief that the eye was expressly designed. On the other hand, I cannot anyhow be contented to view this wonderful universe, and especially the nature of man, and to conclude that everything is the result of brute force."³ Or again to Asa Gray, November 26th, 1860

1 Quoted by R.M. Young, The Impact of Darwin on Conventional Thought, 28

2 Life and Letters of Chas. Darwin, Vol. II, 158

3 Ibid., 312; Letter of May 22nd, 1860.

"I cannot think that the world, as we see it, is the result of chance; and yet I cannot look at each separate thing as the result of Design." ¹ And, finally, in a letter to Lord Farrer, August 1881, "I entirely agree with what you say about 'chance' [i.e. that the universe as a whole is not the result of chance] except in relation to the variation of organic beings having been designed ... On the other hand, if we consider the whole universe, the mind refuses to look at it as the outcome of chance - that is, without design or purpose ..." ² Despite the personal difficulty Darwin experienced on the question of design he had Asa Gray's articles published as a pamphlet, at his own expense, and spread them about. They were entitled, "Natural Selection not inconsistent with Natural Theology" and did much to overcome opposition to the doctrine of descent. Lyell recommended it to the Bishop of London. Darwin, says his son Francis, who gives us this account, seemed more concerned with getting acceptance of descent, rather than with natural selection. ³

IV

The dilemma that Darwin experienced was to haunt the attempts of those who came after him to reconcile his theory with a teleological view; and its persistence was to nullify every supposed synthesis. Thus Henry Drummond, the Scottish Presbyterian, who achieved popularity with his books in which he claimed to have taken up the evolutionary ideas of Darwin in the service of the Christian religion and evangelism, revealed that in fact he had only interpreted the evolutionary theory in a one-sided and optimistic fashion. "It is difficult to say how far Drummond had accepted, or even understood, the idea of natural selection". ⁴ Frederick Temple, who in his Bampton Lectures (1884) accepted evolution as axiomatic, could not accept the full implications of natural selection and was not content to regard man as simply the product of a natural process. ⁵ Aubrey Moore, who was enthusiastic about evolution and its

¹ Life and Letters of Chas. Darwin, Vol. II, 353

² More Letters of Chas. Darwin, Vol. I, 395

³ Ibid., 371

⁴ John Kent, From Darwin to Blatchford, 22

⁵ Frederick Temple, The Relations between Science and Religion, Bampton Lectures, (1884).

possibilities, as he understood them, for Christian apologetic, discerned a flaw in the Darwinian position in this respect, that the overt teleology of evolutionism did not rest upon the foundation of natural selection. "The new view of nature", he wrote, "which the remarkable progress in biological investigation has fostered and spread, if not avowedly teleological, is at least implicitly so".¹ But the implicit teleology resided in an evolutionary theory that was independent of Darwin's hypothesis. "The Church's so-called 'acceptance of evolution' often amounted to little more than the adoption of pre-Darwinian, Hegelian belief that history, now including the biological history of man and other creatures, revealed a process of development in which the Spirit progressively dominated Matter."² But this represented no real synthesis between the philosophy of Darwin and teleology.

In 1909 P.N. Waggett, contributing an article to a collection of essays to mark the jubilee of the publication of The Origin, made the same distinction between evolution and natural selection. His essay was entitled "The Influence of Darwin upon Religious Thought". The Design Argument, he contended, in its pre-Darwinian form was too narrow and circumscribed. Darwin set us free from this, and taught us to see purpose not in the "under jaw of the swine that works under the ground", or in any of the particular adaptations that Paley collected, but in "a purpose transcending, though resembling our own purposes", and "everywhere manifest".³ But such a view is not to be inferred from the premises that Darwinism affords. If it is maintained in association with Darwinism it must be seen as emanating from another source, indeed, from the general idea of progress and purpose attaching to evolution in the nineteenth century. The reason why Waggett maintained this notion here, becomes clear in the earlier part of his paper, where he distinguished between natural selection and evolution, and showed that he adhered, and would adhere, to the idea of evolution even if natural selection were shown to be mistaken, or had in the future to be discarded.⁴

1 Aubrey Moore, Science and Faith, 98

2 John Kent, From Darwin to Blatchford, 28

3 P.N. Waggett, 'The Influence of Darwin upon Religious Thought' in Darwin and Modern Science, Ed. A.C. Seward, 492

4 Ibid., 484

In America the main body of religious thought gradually embraced some scheme of reconciliation with science in the years after 1870 "This reconciliation commonly took the form of discriminating ... between evolution and Darwinism; that is, between some notion of developmental change (often quite vague) and the particular hypothesis of natural selection".¹

The apparent incompatibility of evolution by natural selection and teleology is illustrated especially clearly in the case of the co-discoverer of the theory - Alfred Russell Wallace. Wallace, a short time after the publication of The Origin, began to lose interest in scientific matters, and became more concerned with social questions. His belief in progress increased as his conviction about the centrality of natural selection declined. As early as 1864 he was ceasing to believe in the all-sufficiency of the mechanism of natural selection where man was concerned. He wrote in 1864 that progress was slow, "... but it still seems to be progress ... there is undoubtedly an advance - on the whole a steady and permanent one ... ; and as I cannot impute this in any way to the 'survival of the fittest', I am forced to conclude that it is due to the inherent progressive power of those glorious qualities which raise us so immeasurably above our fellow animals, and at the same time afford us the surest proof that there are other and higher existences than ourselves, from whom these qualities may have been derived, and towards whom we may ever be tending."²

Wallace was not a religious man, yet the difficulty of maintaining any sense of purpose or destiny for the human race alongside a consistent theory of natural selection was clearly apparent. And there were many others like him, who, quite apart from the doctrines of orthodox theism, felt that they could not live in a world that was a-moral and purposeless, in which there was no ultimate affirmation of meaning for human existence. Huxley, who as we have seen,

1 C.E. Russett, Darwin in America, pp 27 & 28

2 A.R. Wallace, The Development of Human Races under the Law of Natural Selection, 1864, Reprinted in Natural Selection and Tropical Nature: Essays on Descriptive Biology, (1891), 185. Quoted by John Kent, From Darwin to Blatchford, 30

in his earlier years, professed to be able to reconcile teleology and Darwinism, later came to experience and embody the conflict that these engendered. The "struggle for existence" which had appeared to lead man upwards was, in fact, at variance with his moral and social progress.

Social progress means a checking of the cosmic process at every step and the substitution of it for another, which may be called the ethical process; the end of which is not the survival of those who may happen to be the fittest ... but of those who are ethically the best ... The ethical progress of society depends, not on imitating the cosmic process, still less in running away from it, but on combating it. 1

The notion of progress and purpose in human life was found, on more mature reflection, not to be based on the Darwinian picture of nature at all, but had to be derived from some other source. Nature, as seen through the eyes of Darwin was, Huxley acknowledged, neither conspicuously benevolent nor necessarily progressive. The Darwinian doctrine did not entail that necessary progression from lower to higher forms which might justify suffering. Retrogression was as likely a phase of evolution as progression. 2

Thus both Wallace and Huxley, with no religious axe to grind, were compelled ultimately to base their hopes for mankind upon premises other than those of Darwinism. Both serve to illustrate the irreconcilability of Darwin's theory and teleology even in the wider sense on which Huxley wished to affirm it.

Others, too, testified to the picture of nature and the universe which Darwinianism evoked. G.J. Romanes was a young graduate when he read Darwin's book. It made an extraordinary impression upon him. He had been a devout Evangelical, but he felt compelled to renounce his faith and embrace the desolating picture of the world that the doctrine of the 'new faith' conjured before him.

1 T.H. Huxley, Evolution and Ethics, 81 & 83

2 A.E. Taylor argues in The Existence of God, that the idea of progress associated with evolution in the last century by literary men has no grounds for support in Darwinism. Evolution could work in the opposite direction, i.e. from the complex to the simple. It has, in fact, no direction except compatibility with the environment. 62 & 63.

"I am not ashamed to confess", he wrote in A Candid Examination of Theism, "that with this virtual negation of God the universe to me has lost its soul of loveliness; ... when at times I think, as think at times I must, of the appalling contrast between the hallowed glory of that creed which once was mine, and the lonely mystery of existence as now I find it, - at such times I shall ever feel it impossible to avoid the sharpest pang of which my nature is susceptible." 1

Bradford read The Origin at the age of sixteen and cursed "the rigorous logic that wrecked the universe for me and for millions of others", that gave them

a feeling of utter insignificance in the face of the unapprehended processes of nature ... a sense of being aimlessly adrift in the vast universe of consciousness, among an infinity of other atoms, all struggling desperately to assert their own existence at the expense of all the others. 2

Where the import of Darwin's doctrine was properly understood and accepted the view of nature and the universe which it evoked was irreconcilable with teleology whether in the narrower or wider form.

The general acceptance of The Origin, and the campaign that followed on its behalf by Huxley and other disciples of Darwin, led very largely to the virtual disappearance of the design argument as a serious apologetic force for theism. It meant its banishment from the centre, for no particular thing could be regarded as the result of design on the part of the Deity. Thus the cumulative force of the design argument, upon which Paley had placed so much emphasis, was destroyed at a stroke. This was hailed by some leaders of religious thought who accepted Darwin's theory as a gain rather than a loss, for it was considered to introduce a wider teleology - a teleology of the molecular structure, of the general laws of nature, of purposive development and progress. But those who took Darwin's premises seriously discovered this was not so, that the pioneer led them not to the promised land, but into a trackless desert, and the picture of the universe which it created was the very antithesis of design and purpose. To continue to believe, despite all this, in design in nature and in a purpose for humanity was to do so by a mere arbitrary act of will, for the grounds for so believing were entirely wanting.

1 Physicus =G.J. Romanes A Candid Examination of Theism, 114

2 G. Bradford, Darwin, 245 - 7 Quoted by G. Himmelfarb Darwin and the Darwinian Revolution, 321

There were those who saw the fundamental incompatibility of Darwin's theory and design and stated plainly what it meant. Canon J. Mozley, in The Times review of the Duke of Argyll's book The Reign of Law, January, 31, 1867, wrote, "Natural selection, to which Mr. Darwin assigns the origin of species, is adaptation by chance, and, therefore, not by design: for a result obtained by chance is one emptied of design. If chance means anything, it is the negation of purpose. Natural selection is adaptation without purpose. It is, moreover, a theory of waste ... and in that it does violence to nature, of which economy is a fundamental law." ¹ Charles Hodge, the Professor of Systematic Theology at Princeton, considered that the distinguishing feature of Darwinism was the rejection of "teleology, or the doctrine of final causes", and "the denial of design in nature is virtually the denial of God." ² But those who were prepared to make this assertion of a basic contradiction between Darwin's theory and design were few.

J.R. Moore in his book The Post-Darwinian Controversies 1870-1900 divides advocates of evolution in the period after 1870 into Darwinists and Darwinisticists. Darwinists maintained the theory of evolution by natural selection in the manner in which Darwin had himself advocated it. Darwinisticists introduced some elements which neutralized the character of natural selection and gave to evolution a teleological nature - things which Darwin would have rejected as destructive of his theory. The rationale of Darwinisticism was that it presupposed some directing force. Evolution was made universal and taken beyond the biological limits by these followers of Darwin, especially many Christians who embraced the theory. Otto Pflleiderer in Germany and Ward Beecher in America provided a metaphysic that overruled natural selection, a metaphysic they considered worthy of a universal and omnipotent Creator.

1 The Times, January 31, 1867, p.5, col. 6

2 C.E. Russett, Darwin in America, 26

Moore argues that the liberal theologians did not accept Darwinism, but only Darwinisticism, thus they were mistaken in thinking that they had accepted Darwin and natural selection. The only Christians, he contends, who could accept Darwin and natural selection were the orthodox theologians of whom he cites principally G.F. Wright and Asa Gray.

Gray felt the difficulty of Darwin's analogy at the end of Plants and Animals under Domestication. He based his case upon the design or purpose of variations. That was the raw material upon which natural selection worked and without which natural selection by itself would probably achieve nothing.

In 1882 Romanes argued against Gray that natural selection dispensed with design, unless it could be shown that the selected variations always take place "in the directions required for the operation of the physical cause in question". Here the burden of proof lay with the natural theologian. Gray replied that natural selection was no substitute for intelligence since it cannot account for the favourable variations that arise. But Romanes insisted that a proper understanding of natural selection presupposes the existence of promiscuous variations which only seem to occur in special and advantageous ways on account of all other variations being eliminated. Gray could not accept this. "Omnifarious variation is no fact of observation, nor a demonstrable or, in my opinion, even a warrantable inference from observed facts. It is merely a hypothesis, to be tried by observation and experiment". He did, however, concede the point that "if variation in animals and plants is lawless, of all kinds and in all directions, then no doubt the theory of natural selection may be 'the substitute of the theory of special design'".¹

Romanes maintained that Darwin's authority was unchallengeable on this point and clinched the argument by quoting the 'stone-house' analogy in full, and so the exchange ended. Gray had long ago admitted that he had found it unanswerable.

¹ J.R. Moore, The Post-Darwinian Controversies, 277

Wright defended Darwinism and deemed it compatible with Christianity. His defence, however, turned upon the same point which had been in dispute between Gray and Romanes, viz., was there a direction or purpose in variations themselves prior to the operation of natural selection. "Large numbers of individuals", he argued, "do not vary at the same time and in the same direction, by chance". The tendency to variation itself "remains among the mysteries of creation". Moore himself acknowledges that this was the heart of Wright's position and "an idea to which he, like Gray, inevitably recurred: the ultimate causes of variation are inscrutable and thus, by implication, divine".¹

By appealing in this manner to a superintending power which directed the course of variations in nature it is doubtful whether Gray or Wright fulfilled their claim to have accepted Darwin and natural selection. It is arguable that they were themselves advocates of a subtle version of Darwinisticism.

Baden Powell, Savilian Professor of Geometry in the University of Oxford, embraced without reservation Darwin's theory immediately it was published. He wrote in Essays and Reviews (1860), "A work has now appeared by a naturalist of the most acknowledged authority, Mr. Darwin's masterly volume on The Origin of Species by the law of 'natural selection', - which now substantiates on undeniable grounds the very principle so long denounced by the first naturalists, the origination of new species by natural causes: a work which must soon bring about an entire revolution of opinion in favour of the grand principle of the self-evolving powers of nature".²

Powell had for a long time before Darwin's book appeared been a staunch advocate of the rule of law throughout the universe, and he considered this to be a sounder premise for natural theology and belief in a Supreme Intelligence behind the world than the traditional teleological argument which appealed to design in its particular parts. He argued that there could be no interruptions of natural

1 J.R. Moore, The Post-Darwinian Controversies, 289

2 On the Study of Christian Evidences, in Essays and Reviews, 139

law which comprehended everything physical. Revelation lay outside this field and religious experience had nothing to do with matters of fact or indeed with the physical world at all. "The more knowledge advances, the more it has been and will be acknowledged that Christianity, as a real religion, must be viewed apart from connexion with physical things".¹ The realm of physical phenomena was purely the domain of science.

It is against this rather unorthodox separation of fact and faith, of the natural and religious realms, that we must set Powell's enthusiastic acceptance of Darwinism. The dichotomy is so sharp and so absolute as to bring into question the soundness of the conclusions which he drew from it. Faith, because it was thus confined to the realm of the mystical and the subjective, was he believed unaffected by anything that might take place in the realm of science and history. Theories relating to the physical world could have no real bearing or influence upon faith and religion. This was reflected in his eagerness to accept hypotheses which seemed to mark the progress of science. Lamarck, the Vestiges and Darwin all seemed alike to him in this respect.

But there was, no doubt, something else at work which contributed to Powell's acceptance of Darwin: he saw Darwin's book as being illustrative of, and confirming, the view he already held of the "grand principle of the self-evolving powers of nature". It is doubtful whether he was in fact listening to what Darwin was really saying about natural selection and random variation in The Origin. Darwin did not himself subscribe to any 'principle' of the self-evolving powers of nature. It was just such a view of evolution that his book was intended to supersede.

Morse Peckham in his paper Darwin and Darwinisticism draws a distinction between the ideas of metaphysical evolution which were current in 1859 and the actual ideas that Darwin expounded.

¹ On the Study of Christian Evidences, in Essays and Reviews, 128

In 1859 a metaphysic of goal-directed organic growth was dominant in the higher levels of Western culture. Canon Raven has pointed out that the agitation produced by Darwin cannot be understood without reference to the Essays and Reviews which appeared only a few months after, or to Colenso's work which appeared in 1862. The academic difficulties of Max Müller and Benjamin Jowett are equally inseparable from the total situation.

Today it is somewhat difficult to understand why all these books and events should have been interconnected in the covert culture of the day. But a reading of Essays and Reviews shows the deep penetration of metaphysical evolutionism into the minds of its authors.

... The biologic world that Darwin revealed, if you did not read him with the assumptions of metaphysical evolutionism, is a world totally lacking in the organised or teleological process characteristic of evolutionary metaphysics. 1

Charles Kingsley also showed an enthusiastic willingness to accept Darwin. But again the question must be asked, was he in fact accepting Darwinism or Darwinisticism? Did he really accept natural selection with all its implications for the teleological argument or was he embracing directed evolutionism? In his paper The Natural Theology of the Future he states that he was pleased to find on reading St. George Mivart's book The Genesis of Species that he was in agreement with the views he found there, views which he himself had long held. 2

Mivart had written his book as an attack on Darwin's doctrine of natural selection, and in order to establish the position that variations are directed, a view which was quite unacceptable to Darwin. In the course of the paper, Kingsley answers those who say that they see no marks of design in the world, and that what used to be considered as marks of design can better be explained as the results of evolution according to necessary laws, by strongly affirming that design is self-evident in nature and where there is design there must be a designer. "We might accept", he contends, "all that Mr. Darwin, and all that Professor Huxley, have so learnedly and so acutely written on physical science, and yet preserve a natural theology on exactly the same basis as that on which Butler and Paley left it". Yet he does not say explicitly how this reconciliation is to be achieved. The force of his argument seems to be that God can work in the most extraordinary ways, that nothing is too hard for him,

1 Darwin and Darwinisticism by Morse Peckham, Victorian Studies, 389

2 Charles Kingsley, Scientific Lectures and Essays (1885), 313

that if everything has evolved from some original form by the laws of nature then there is nothing in this that contradicts the supreme wisdom and power of a Creator who so ordered things that this should happen. "We know of old that God was so wise that he could make all things; but behold, he is much wiser than even that, that he can make all things make themselves".¹ Such a view is indeed, perfectly compatible with Mivart and directed evolutionism, but would appear to have much less in common with the rationale of Darwinism.

¹ Charles Kingsley, Scientific Lectures and Essays (1885), 332

A TELEOLOGICAL VIEW OF THE WORLD AND
MAN

I

The strength of Darwinism lay in its appeal to the imagination, in the way in which the gaps in the supposed evolution of an organism could be filled up insensibly by the small steps - the 'infinitesimally small steps', as Darwin put it in the first edition of The Origin - that were considered to have taken place in its development. He felt that such a notion presented less difficulty to the imagination. The mind was capable of connecting the phenomena of nature which displayed resemblances by the interposition of an imaginary series.

But what of those things in nature which could not be resolved by the imagination in this way? When Darwin was presenting his argument he was confident there were no such phenomena, but at other times he was uncertain. At times the argument that he laboured to establish took on a strange appearance. Could it possibly be that all the beautiful adaptations of organisms, and their relationships to each other and the inanimate world, had come about by chance variations and the blind forces of natural selection? There were facts that seemed to deny this and which the imagination found hard to conquer. When they are considered they have the force of breaking the spell of Darwinism upon the imagination, of interrupting the cumulative effect of the argument from natural selection and gradual change, for they appear to exemplify an order and purpose in nature which the invoking of such a random process seems inadequate to explain. It is some of these facts that we must now review in order to assess their significance for the ateleological position of Darwinism, and for the tenability of the design argument.

First, the fit between the organism and the external world.

The remarkable complexity of living organisms and the nature of their relations with their environment give rise in the unsophisticated mind to a sense of wonder and surprise that the world is so eminently suited to the support of life,

and not merely animal life, but intelligent, human life. When the matter is pursued beyond the elementary stages, the conviction that the rise and persistence of living organisms implies intelligent pre-adaptation is not weakened, but conceivably strengthened by increasing knowledge of the details of adaptation.

Modern cosmology has come to show that the universe is basically far more appropriate for the emergence of life than was previously suspected. The essential nature and development of the universe must have been determined (perhaps 'programmed' is not too strong a word) during the first micro-seconds of this cataclysmic event.

The balance of probability against life existing on this planet is so high, and the complexity of factors making it possible so great, that even the slightest re-arrangement would have fore-closed the issue. This circumstance impresses the mind with the idea that the order that we observe in the world and its suitability for life and human development is not merely a chance emergence from random forces, but is something which has been present in the universe from the beginning.

If (1) the universe were not expanding, if (2) there were no stars, if (3) the proton - proton forces were slightly different without (4) a certain ratio between the basic forces of interaction and (5) a certain relationship between the fundamental constants - without all the space and time in the cosmos the universe would be 'dead'. For even an apparently trivial difference in any of these five factors would result in the 'evolution' and diversity of the cosmos being impossible to conceive.

In the light of this W.H. Thorpe states, "Indeed, we can say that the 'Argument from Design' has been brought back to a central position in our thought from which it was banished by the theory of 'evolution by natural selection' more than a century ago." ¹

¹ W.H. Thorpe, Purpose in a World of Chance, 10 & 11

The essence of our presence in the Universe today is that we require the Universe to have certain properties. Long before we reach the problem of biological evolution on Earth ... we face this more fundamental question. At least one essential condition of our existence is that the Universe must expand at almost precisely the same rate at which we measure it to be expanding. If that rate had been less by an almost insignificant amount in the first second, then the Universe would have collapsed long before biological evolution would have taken place ... Sir Bernard Lovell, In the Centre of Immensities, (1979), 123

The idea of evolution was pressed into service in the nineteenth century to explain almost everything. It was certainly pushed far beyond the biological limits that Darwin originally conceived for it in The Origin. There he simply intended to use it to describe what he saw, or rather imagined he saw, happening in organic nature. But soon the idea was employed to explain the origin and existence of the universe itself. For this, of course, there was no justification. We cannot, as Tennant points out, speak of or conceive "a struggle for existence between rival worlds out of which ours has survived as the fittest" for the purpose of supporting life. "Natural selection cannot here be invoked, and if the term 'evolution' be applicable at all to the whole world process, it must have a different meaning from that which it bears in Darwinian biology. Presumably the world is comparable with a single throw of dice. And common sense is not foolish in supposing the dice to be loaded." ¹

The conspiracy of factors in the inorganic world to support and minister to life remains a problem for atheistic and ateleological theories of the origin of the world. The adaptation of inorganic nature to the needs of organic life cannot be explained in the same way as the adaptation of non-intelligent organisms, for the formative principle is lacking.

Unique assemblages of unique properties on so vast a scale being thus essential to the maintenance of life, their forth-comingness makes the inorganic world seem in some respects comparable to an organism. It is suggestive of a formative principle. But if there be such a principle it is not conceivable after analogy with the life and mind of organisms, and cannot be said to be intrinsic or internal: because the inorganic ... is devoid of life, and - at any level of explanation - is devoid of intelligence and foresight. ²

This complexity of the cosmos which makes life possible, and its power to sustain it once life is brought into existence, was presupposed in the classical Darwinian argument which offered no explanation of the origin of such an arrangement. Evolution by natural selection was illicitly extended from its limited role to become an omnibus explanation by Darwin's contemporaries,

¹ F.R. Tennant, Philosophical Theology, Vol. II, 87

² Ibid., 86 & 87

but in the process of their doing this the concept of evolution was subtly changed and emptied of its precise meaning, while at the same time carrying the authority and prestige that had come to attach to it in its original role. Thus it was considered that somehow the world had 'evolved', and the mere invocation of the term 'evolution' was in some way regarded as accounting for the remarkable adaptation and fitness of the inorganic world to the existence and maintenance of organic life. The more, however, we penetrate beneath the surface of this explanation, and the more fully science reveals the complexity of both phenomena, the less convincing this account seems to be, and the closer a teleological explanation seems to press upon the mind. As Thorpe has put it; "There seems now to be justification for assuming that from its first moment the universe was 'ordered' or programmed - was in fact cosmos not chaos." ¹

II

One of the facts of nature which appears to bear out this reasoning is found in the way in which the adaptiveness of the organism seems to presuppose the environment. The whole idea of organisms being programmed to develop in a particular way is post-Darwinian. The discovery of the DNA code has revealed how the unfolding of the life of the organism is predetermined from conception, how the successive stages of its development will take place according to a pre-arranged pattern.

That environmental information should be reflected in the molecular structure of DNA, without having been causally 'imprinted' on it by direct environmental impact, is the most nearly Leibnizian discovery of modern science ... ²

What Darwin puzzled over, viz, the emergence of certain characteristics in the later development of the animal, which were not manifest in the initial stages, is now understood on this principle. This remarkable correspondence between the pre-determined pattern of life of the organism in the womb, the seed, and the egg, and the exigencies of the environment into which it will eventually be thrown, is a phenomenon which the theory of evolution by natural selection does not appear wholly to explain.

¹ W.H. Thorpe, Purpose in a World of Chance, 12

² R. Spilsbury, Providence Lost, 16

For many characters [the eye for example], the possibility of a fit between organism and environment is pre-established developmentally (however much the fit may be improved by subsequent interaction and learning). Such characters develop from within, yet match the without; their inner development reflects the conditions and exigencies of life in-the-open. Vision germinates in the dark. How is it possible that the developing organisms should reflect in this way the environment into which they will be thrown, seeing that the latter has no specific influence on the structures that mediate the relationship? ¹

This problem is greatly magnified when we come to consider such complex inner 'programmes' as the navigational aids and migratory habits of birds. "How can the long arm of coincidence stretch so far as to equip migratory birds with innate 'maps' of their routes and star-charts?" ² To attempt to explain such phenomena on the basis of natural selection is to overlook the fact that selection is "the principle of the post-established harmony". It can only operate on the basis of variants offered, and presupposes a supply of the right variations. As Tennant has pointed out elsewhere, "The survival of the fittest presupposes the arrival of the fit, and throws no light thereupon". ³ The Darwinian hypothesis leans ever more heavily upon a coincidence of lucky accidents. Not only has it to presuppose the emergence originally of an external world suitable for, and propitious to, organic life, but it must now also presuppose the nature of that life to be such that it anticipates the external conditions in which it will be placed. Given the facts of life and the world, the Darwinian hypothesis may account for the modification of the forms of life found within the world, though the extent of such change may be challenged. But the fundamental question is, Where did that life, environment, and organization come from in the first place? How was it thus? The instincts of birds, like the cells of their bodies are highly complex phenomena, and are not lightly to be assumed, if thereby it is proposed to dispense with the necessity to account for design. It may be recalled that Paley also urged this question with regard to the instinct of birds to build nests. He acknowledged that it may be modified and adapted according to the conditions and circumstances with which the animal meets ... "but still the propensity is instinctive," and "the question returns, when the propensity to build at all?" ⁴

1 R. Spilsbury, Providence Lost, 9

2 Ibid., 10

3 F.R. Tennant, Philosophical Theology,

Vol. II, p.85

4 Chapter 1 this thesis, p.28

Always and everywhere the theory of natural selection, rightly understood, comes up against this question in one form or another. T.H. Morgan, in Evolution and Genetics puts it thus,

The man of science believes that the organism responds today as it does because at present it has a chemical and physical constitution that gives this response. We find a specific chemical composition, and generally a specific physical structure, already existing. We have no reason to suppose that such particular reactions would take place until a specific chemical configuration had been acquired. Where did this constitution come from ? This is the question that the scientist asks himself. 1

The organization of life, both physical and mental, seems to presuppose in a remarkable way the environment of the external world in which it will be placed. The Darwinian hypothesis does not really set out to answer the question of how this is the case. It is, wrote A.E. Taylor,

not a theory about the origin of organisms, or of life; it takes organisms as already known to be in existence and professes only to explain how they are modified by the action of their environment upon them. It presupposes as already existing the antithesis between the living organism and the environment upon which, and against which, it maintains, or fails to maintain, itself. 2

Consequently it does nothing to dispel the mystery of the harmony and relationship of these two worlds, the inner world of the organism and the outer world of the environment for which it is being prepared by the implementation of its genetic code. It might seem that these two developments, the inner and the outer, were taking place on two different planes - or planets ! "How is it comprehensible that intra-cellular molecular changes should correspond 'code-wise' to the exigencies of life under sun and stars, when these are used as reference points in the migration of birds ?" 3 Before this mystery the theory of natural selection is compelled to remain silent. Any explanation in terms of it, which might be attempted, would be more amazing than the phenomena itself. If the argument is persisted in beyond this point it can only be from a blind conviction that time, chance and selection can 'explain' everything, and from a concomitant horror of non-materialistic ways of thinking.

1 T.H. Morgan, Evolution and Genetics, 10

2 A.E. Taylor, Does God Exist ?, 61

3 R. Spilsbury, Providence Lost, 13

A further illustration of how the organic and inorganic worlds are peculiarly fitted and related to each other may be seen in the special way in which chemical elements minister to the support of organic life.¹ Pathology is peculiar to organisms. Only in the realm of biology have we the concept of disease. Astronomy, dynamics and hydraulics, etc., which study the movements of inert matter have no branches corresponding to pathology as it is related to physiology.³ This is because where inert forces are concerned we have no conception of what they ought to do but only of what they in fact do. In the conception of an organism disease implies a normal state of health in which all the parts and organs of the body work together to preserve its well-being and to fulfil one end. Now there would appear to be no direct relationship between the structure of the organism and the chemical elements of the inorganic world. Here it would seem there is a separation at least as real as that between the inner genetic code of an organism and the environment into which it is thrown, yet we find that the chemical compositions of the inorganic world relate to the bio-chemistry of the organism and supply its deficiencies and correct its faults when the organism degenerates in disease. The same holds for relations within the organic world, where we find that a multiplicity of herbs and animal secretions can be used in medicines to restore health to the organism that is affected by disease. Were it the case that but a few substances in either case were useful the relationship might be dismissed as a coincidence, but where we find such an extensive range of natural products capable of meeting the special circumstances and conditions created by disease the correspondence is suggestive of pre-adaptation.²

1 See Chapter II of this thesis for this argument in Paley.

2 Here the analogy between a machine, designed to serve a particular purpose, and an organism is particularly marked, for the breakdown or failure of the machine corresponds to the pathological condition of the organism. If we can therefore imagine a machine not merely designed to perform a particular function, but also equipped with the means by which breakdowns in its operation may be corrected and repaired we shall see how the suggestion, or impression, of purposive design is further heightened and accentuated.

Few of those who have considered the relations of the organism to its environment have failed to remark upon the peculiar properties of water.

On many counts water is the uniquely suitable liquid ... essential for life. It is particularly fortunate that it is so abundant on earth. It has been shown (Henderson 1913, Firsoff 1962) that conceivable alternative living systems could be based on liquid ammonia, or on other liquids, but all are inferior to water in most respects, in their liquid states. None are serious alternatives under terrestrial conditions. It is not enough to have suitable physical and chemical properties; the liquid must be abundant and distributed all over the surface of the globe ... if ice were heavier than water and settled to the bottom of lakes and of the polar oceans, it would thaw extremely slowly, and would long ago have locked up most of the water of the planet and denied its further use to living organisms. ¹

Taken together with all the other 'lucky accidents' which establish a rapprochement and harmony between the organic and inorganic world, this cannot fail to impress the mind with at least the possibility that the cosmos was planned, and that without intelligent forethought might easily have been a chaos.

Yet another instance of 'adaptation' in this respect which serves to strengthen the impression, is the complementary function of animals and plants as regards the atmosphere. Nearly all animals require to breathe in or absorb oxygen from the air. This combines with the carbon existing in the animal tissues, and is breathed out as carbon dioxide. On the other hand the plants absorb the carbon dioxide from the air, and under the influence of sunlight break up the carbon dioxide, fix the carbon, and return the oxygen to the air. In this way the constancy and composition of the atmosphere is preserved.

There is a conspiracy of factors at work which preserve the cosmos, and which relate to, and appear to presuppose the existence of life. There is the interaction not only of the different parts of the organism, but of one part of organic nature with another, and between the organic and the inorganic worlds. The complexity and extent of these relations far transcend the limits of the theory of natural selection, even if it is regarded as offering an explanation of some developments within the organic sphere.

¹ A.E. Needham, The Uniqueness of Biological Materials (1965), 10

Lawrence J. Henderson, the biologist, addressed himself in his book The Fitness of the Environment to the question of how the world could prove to be so hospitable to life. The environment exists prior to the organism, yet there is a reciprocity between them which is not accounted for in terms of the Darwinian hypothesis. Natural selection does no more than mold the organism and can change the environment only secondarily, without really altering the primary quality of environmental fitness.

There is, in truth, not one chance in countless millions of millions that the many unique properties of carbon, hydrogen and oxygen, and especially of their stable compounds water and carbonic acid ... should simultaneously occur in the three elements otherwise than through the operation of a natural law which somehow connects them together. There is no greater probability that these unique properties should be without due cause uniquely favourable to the organic mechanism. These are no mere accidents: an explanation is to seek. ¹

When this wider picture is viewed even the evolutionist acknowledges that the ateleological explanation appears in a strange light. "When we consider", wrote T.H. Morgan, "the immeasurable physiological adjustments of any organism, and the structural adjustments of the parts of the body, to each other, and to the environment, an appeal to evolution though chance variation may seem preposterous."² Was it not just such a thought as this which must have struck Darwin when he wrote, "It seems an absurd proposition, that every budding tree, and every buzzing insect and grazing animal owes its form to that form being the one alone out of innumerable other ones which has been preserved" ?³

"The basic objection", writes Richard Spilsbury, "to Neo-Darwinism is not that it is speculative, but that it confers miraculous powers on inappropriate agents. In essence, it is an attempt to supernaturalize nature, to endow unthinking processes with more-than-human powers - including the power of creating thinkers. I find it impossible to share this faith that supra-human achievements can be encompassed by sub-human means, and sub-rational mechanisms".⁴ Thus, we see how quickly the picture can be changed from an ateleological one, in which appeal is made to a vague evolutionary concept, in which chance and selection can

1 I.J. Henderson, The Fitness of the Environment (1913), 276

2 T.H. Morgan, Evolution and Genetics, 144

3 Notebook 'E', 145

4 R. Spilsbury, Providence Lost, 19

explain all, to one in which there is a growing impression that the cosmos has been intelligently planned. The reason for this is, that Darwin's appeal was to the imagination. The evocation of suggestive illustrations, of the ways in which organisms might have been built up by the accumulation of successive small random changes, serves to focus the imagination upon the possibility of such a development, and the cumulative effect is to hold it there. But when illustrations of purpose and pre-adaptive design in nature are adduced in support of a teleological explanation of the cosmos, it has the effect of interrupting and breaking the sway of such ideas upon the imagination and of inducing a different and contradictory view of nature.

III

So far we have only considered those ideas which suggest a preadaptive fit between the physical organism and the physical conditions of the world in which it is placed. We have also to consider the remarkable relation between thought and thing, between mind and nature, which is also suggestive of 'prospective contrivance'.

We see the evidence first for this interaction between mind and the external world in the way which the perceptions of the mind, which are in themselves mental phenomena, are nevertheless accompanied by a conviction of the objective reality of the objects which are thus perceived; that is, there is, as it were, an underlying natural guarantee of the reality of the external world which the mind perceives, which passes unquestioned, until we begin to reflect upon our experience. Then the philosophical question is raised of how the two can possibly be related, and what justification there is for inferring the one from the other. In an unreflective state there is a natural rapport, or fit, between the perceptions of the mind and external reality; but once it is questioned the constituent parts of experience, body, mind and the external world, fall apart, and reason cannot put them together again. Van Peursen has expressed the

problem thus,

Antecedent to the whole business of theoretical study and research, which arranges objects in due order and so forth, is the pre-objective field where man and reality, inner and outer worlds, mental and material, still defy distinction. It is only afterwards that they get separated. 1

This 'fit between experience and the external world, so that we naturally move about without reflection and calculation, and have our being in the world, is strangely suggestive of some remarkable designedness. If we think of them as separate entities, mind, body and external world, as in the philosophy of Descartes, or Berkeley, the rapport between them becomes either an improbable accident, or coincidence, or only accountable in terms of the intervention of the deity who guarantees the relationship.

It would appear that man is 'dovetailed' into the world in terms of his experience; that from his earliest moments he is familiar with the external world in such a way as to presuppose its reality and his relationship to it. This, upon reflection, cannot but strike one as an extraordinary thing, as also does the thought that if this complex relationship depended purely upon learning and accumulated experience, it would take a very long time to acquire, and would rather resemble the groping of one who is blind in an unfamiliar situation. Sir Charles Bell remarked upon this association of mind and the world in his Bridgewater Treatise in the following words,

Nothing affords a more perfect proof of power and design, than the correspondence that exists between the perception or ideas that arise in the mind, through the exercise of the organs of the senses, and the qualities of external matters: and although the manner in which the object presented to the outward sense and the idea of it are connected, must ever be beyond our comprehension, they are, nevertheless, indissolubly united, so that the knowledge of the object, obtained by this means, is attended with an absolute conviction of its real existence - a conviction independent of reason, and to be regarded as a first law of our nature. 2

Nothing has happened to dispel the mystery of this union, or to destroy its force as another illustration of what may be regarded as the purposive character of nature and man's experience of it.

1 C.A. Van Peursen, Body, Soul, Spirit, 138

2 Sir Charles Bell, Bridgewater Treatise, On the Hand of Man, 211

Perhaps an even more striking example of the relation between mind and reality which is suggestive of pre-adaptation is to be found in the way in which mind seems to anticipate the reaction and response of the phenomena of nature. The empiricist has, of course, always maintained that our knowledge of nature is essentially and only inductive and experimental. Kant, however, maintained that there was a built-in rapport between the mind and nature, the mind making its own contribution to our experience of reality, while depending upon the perceptions of the senses for the application and exercise of its categories. The question is not a purely speculative one. There are observations which appear to indicate innate qualities and capacities of the mind which anticipate the order of nature and the character of the world. Chomsky remarks, in his essay 'On Interpreting the World'

There seems no reason at all to believe that the child's concept of enduring and recurring physical objects derives from his reflection on the use of language, or on higher-level generalizations that are built on insights into language use, or that Mill's canons have anything to do with the interpretation of the world of experience in terms of permanent persons or things. Such slight experimental work as exists on this matter suggests that the concept of permanent and enduring objects is operative long before the use of language. Thus it appears that a child only a few months old interprets the world in terms of perceptual constancies, and shows surprise if stimuli do not manifest the expected behaviour of 'enduring and recurring physical objects'. If our conjectures are to be made sense of in terms of observation, it would seem that such observations support the conjecture that the 'scheme of enduring and recurring individual objects' is primitive, rather than acquired in the course of language learning. ¹

Chalmers, in his discussion of the intellectual constitution of man and its relation to external nature had remarked upon the very same fact, in almost the same words. ²

Chomsky is, of course, arguing that man's mind is programmed for language learning, that without such an innate structure and capacity it would be inconceivable that a three year old child would be able to master the complexities and difficulties of sentence structure, or learn the appropriate use of words.

1 N. Chomsky, On Interpreting the World, 19

2 Thomas Chalmers, Bridgewater Treatise, The Adaptation of External Nature to the Moral and Intellectual Constitution of Man, Vol. II, p.142

The universality of language amongst human beings and the facility and ease with which it is learned in childhood make us, quite often, unaware of what a sophisticated and highly complex process and acquirement it really is. As Chomsky himself puts it,

Consider a Martian scientist, investigating humans, who observed that some individual knows both English and modern physics. From his point of view, there would be little reason to expect, on general grounds, that the learning of physics was an intellectual achievement of an incomparably higher order which required generations of genius, while the normal child discovers the structure of English with no difficulty. Observing this, he would conclude that the system is fitted to the human mind in a way that the other is not. ¹

This argument for innate grammaticality, which enables human beings to learn and master the use of language which would otherwise be impossible in a life-time, might seem to take us beyond the scope of our present discussion which is the relation and correspondence of the human mind to the external world. But our fellow human beings are a part of the external world, and the apparent pre-adaptation of the mind for social-intercourse with other human beings, is no less significant and worthy of attention in this context than the correspondence of the mind to the impersonal phenomena of nature, its material forces and objects.

Chomsky has strongly argued his case for universal grammatical principles and categories which have an innate basis. As to how this state of things came about he considers it useless to speculate. Human language, he contends, differs in principle from any system of communication amongst animals, and is ultimately attributable to "a specific type of mental organisation, not simply a higher degree of intelligence". ² If we choose to assign this development to "natural selection" we may, as long as we recognise that to do so "amounts to nothing more than a belief that there is some materialistic explanation of these phenomena ... With no knowledge of the laws that determine the organization and structure of complex biological systems, it is senseless to ask what the probability is for the human mind to have reached its present state ... " ³

1 N. Chomsky, On Interpreting the World, 44

2 N. Chomsky, Language and Mind, 62

3 Ibid., 83

Thus, in Chomsky's view, talk about the origins and probable evolution by natural selection of the special and unique organization of the human mind which makes speech and language possible, is little more than speculation, and ultimately the symbol of a blind commitment to a naturalistic explanation. Once again we are confronted with a purposive arrangement in nature, a complex of relationships and correspondences between the human mind and the external world, which includes the existence of other human minds. There appears to be no satisfactory way of explaining how, or why, such an arrangement should obtain if we exclude a teleological account.

However, to return to the relation of the mind to the external world, conceived of as impersonal forces and inert matter, there are observations, like those we have already referred to, which suggest a remarkable agreement, and which are yet hardly attributable to a learning process. Recent experiments show that animals are capable of classifying objects and relations according to abstract categories, especially geometric categories such as 'triangle' and 'circle'. Experimental work has even identified the neural basis for such analysis. This work suggests that there is a primitive neurologically given analytic system which may degenerate if not stimulated at an appropriate critical period, but which otherwise provides a specific interpretation of experience, varying to some extent with the organism. These modern discoveries seem to lend support, in a new way, to Descartes and Kant, contrary to the radical empiricism that has dominated science for two centuries, and which has thrown suspicion on any hypothesis that postulates the "innateness" of forms of knowledge. It also gives new and added strength to the Design Argument, since attempts to account for such remarkable correspondence between mind and the external world by invoking some vague concept of random evolutionary development appear, in the light of the complex issues raised, little more than an expression of the will to believe in a naturalistic explanation - in the power of mindless, impersonal forces to produce not only order in the natural world, but in the mind of man himself, in such a way that he is capable of comprehending and engaging with the order he finds in the universe. "If we decline", wrote Tennant, "to explain

things [in terms of design] it would seem that the only alternative is to regard the self-subsistent entities, of which the world is constituted, as comparable with the letters of type which have shuffled themselves not only into a book, or a literature, but also into a reader commanding the particular tongue in which the book utters its unintentional meaning." ¹

IV

So far as we can tell animals learn according to a genetically determined programme. There is no reason to doubt that this is true also of the fundamental categories of human knowledge, and also, perhaps, other aspects of human behaviour, less fundamental, but of great significance for the individual and society. Sir John Eccles has written of recent research on the brain

It has to be remembered that there are at least three hundred millions of neurones in the human visual cortex ... and only a few hundreds have been experimentally investigated in mammals ... [there are] neurones that respond to synthetic information - lines or slits of determinate length and width, lines or slits bent at angles, and so on ... Doubtless cells responding to more and more complex patterns will be discovered and it might be postulated that eventually cells will be discovered that selectively respond to abstract forms - for example to triangularity, and that this will explain our ability in the recognition of abstract forms. ²

Thus scientific evidence seems to be emerging on a wider scale for the existence of 'innate ideas' and an inherent structure of the mind which is capable of entering into rapport with the order that exists in the material world. Darwin was, as a thorough-going empiricist, contemptuous of the theory of innate ideas. It will be recalled that in his notebooks he had written, "Plato ... says in Phaedo that 'imagery ideas' arise from the pre-existence of the soul, are not derivable from experience - read monkeys for pre-existence." ³ But now it seems, he would also have to account for the 'innate ideas' of the monkey. The question returns, whence this order, this propensity in the first place? What meaning can be given to the proposition which states that through random variation and natural selection three hundred million brain cells in the visual cortex alone have shuffled themselves into a mental organization that is capable of rapport with the molecular structure and organization of the external

1 F.R. Tennant, Philosophical Theology, Vol. II, 111

2 John C. Eccles, Facing Reality, (1970), 160

3 Notebook 'M', 120

world? As the sufficiency of the theory of natural selection began to break down under the weight that it was made to bear, Darwin fell back upon what he had earlier called 'Lamarck's nonsense', the theory of inherited characteristics. In fact he went even further than Lamarck in attempting to explain by means of his hypothesis of pangenesis how changes in the body might be transmitted to the reproductive cells and reappear in the offspring. But there is no scientific evidence for acquired characters. Research into development and inheritance has established that, "the properties of the reproductive cells which are responsible for the characters of the body (and the brain) are inherent in these cells; and that transmission of these properties is independent of the body-cells, and calls for no interference from them. This is summed up in the phrase, 'the isolation of the germ-plasm' ... The egg reproduces the body, not the body the egg" ¹

The correspondence of nature to the processes of the mind has always made a deep impression upon reflective minds, except where a radical empiricism has held sway, the defects of which, however, have sooner or later made themselves felt, and have called for some such corrective as that which Kant supplied for Hume's philosophy. Both Chalmers in his Bridgewater Treatise and Sir John Herschel in his book Natural Philosophy, drew attention to this adaptation of abstract ideas to concrete realities, and the way in which discoveries made in the region of pure thought relate to the facts and phenomena of actual nature - as when for example the properties of conic sections, demonstrated by patient analysis, remained inapplicable till they came to be embodied in the real masses and movements of astronomy. "These marvellous computations", Herschel remarked, "might almost seem to have been devised on purpose to show how closely the extremes of speculative refinement and practical utility can be brought to approximate". ² Thus, the purely theoretical mathematics of the Greeks found application to the material world in the astronomy of Copernicus 1500 years after its first discovery. "It seems quite clear today,"

¹ T.H. Morgan, Evolution and Genetics, 155, 163

² Sir J.F.W. Herschel, Natural Philosophy, (1831), 28

wrote D.S. Cairns in The Riddle of the Universe, "that mathematics enters deeply into the constitution of the universe, and that mathematical theory is certainly something a great deal more than a mere imitation, a reflex of observed natural processes". Sir James Jeans took the view that the universe was ultimately mathematical, while Einstein contended that mathematics were the product of 'imagination' not of observation and memory, 'creative' of thought and shooting far ahead of what has been merely observed. ¹

Karl Popper conceives of the interaction of the mind and the world, not merely in subjective terms, but in the inter-relationships of objective 'worlds' of thought and things. In fact he formulates a theory of three worlds: 'World 1' consisting of all material things - biological and human, artifacts as well as inorganic material; 'World 2' including emotions, feelings, cognition and memory, that is, all subjective states, including perception; and 'World 3' embracing objective knowledge, and culture, stored in books and libraries. Popper's discussion of Worlds 2 and 3 suggests that

a subjective mental world of personal experience exists (a thesis denied by the behaviourists) ... and that it is one of the main functions of the 'second world' to grasp the objects of the 'third world'. This is something we all do: it is part of being human to learn a language and this means, essentially, to learn to grasp objective thought contents ... so that one day we will have to revolutionize psychology by looking at the human mind as primarily an organ for interacting with the objects of the 'third world'; for understanding them; and for bringing them to bear on the 'first world'. ²

On this W.H. Thorpe comments,

Since the objects of 'World 1' - the natural world, the world of physical objects and states - can, as is obvious, be interpreted, understood and if you like 'translated' by the activities of organized science, then does it not follow that the physical world, which can be so understood and translated is in a sense on a par with Popper's 'World 3' ? It is a world which has been understood, to a very, very small extent by the proved experience of scientific men during the last ten thousand years, and therefore this understanding is, of course, in 'World 3'. Can it not be plausibly argued that what man is understanding is in fact a 'pre-existing' knowledge of nature, a plan, which ties the whole universe together in a creative unity; and further, that it is this, which by such laborious and painful processes, we may partly come to understand ? ³

¹ D.S. Cairns, The Riddle of the Universe, 135

² K.R. Popper, Objective Knowledge, 156

³ W.H. Thorpe, Purpose in a World of Chance, 100

Popper's 'third world' represents man's universal, objective cognition of the natural world, and without this body of ideas, of thought and culture, the realm of nature as such could have no significance. The two belong essentially together and are a unity, an organic whole. A similar thought has been expressed recently by the physicist J. Wheeler,

No theory of physics that deals only with physics will ever explain physics. I believe that as we go on trying to understand the universe we are at the same time trying to understand man ... Only as we recognise that tie will we be able to make headway into some of the more difficult issues that confront us ... Man, the start of the analysis, man the end of the analysis - because the physical world is in some deep sense tied to the human being. 1

Now this understanding of mind and its relationship to the external world brings man into close conjunction with nature as far as the teleological view is concerned. Indeed without man occupying this relation with reality, it is difficult to see how the design argument can be sustained. This was one of the weaknesses of the classical presentation of it in the eighteenth century, that it concentrated upon specific examples of contrivance in nature, but failed to embrace a wider teleology to which later some of the writers of the Bridgewater Treatises appealed, and which was part of Tennant's understanding of the design argument in the early part of this century. "We must allow" he wrote, "to ontal nature an intrinsic constitution such that minds can make ... nomic order out of it" 2 At the same time minds need to be appropriately structured in order to be able to do this. It seems that some such account of the inherent rationality of both mind and the world is necessary in order to escape from a position of total scepticism. C.S. Lewis put the matter very succinctly when he wrote, "Every theory of the universe which makes the human mind a result of irrational causes is inadmissible, for it would be a proof that there is no such thing as proofs, which is nonsense". If the mind is no more than the chance concatenation of atoms then the "finest piece of scientific reasoning is caused in just the same irrational way as the thoughts a man has because a piece of bone is pressing on his brain. If we apply our rule both are equally valueless". 3

1 A.R. Peacocke, Creation and the World of Science, 66

2 F.R. Tennant, Philosophical Theology, Vol. II, 90

3 C.S. Lewis, Miracles, 28

The shortest form of this argument is given by Professor J.B.S. Haldane.

"If my mental processes are determined wholly by the motion of atoms in my brain, I have no reason to suppose that my beliefs are true ... and, hence, have no reason for supposing my brain to be composed of atoms." ¹ Darwin, it will be recalled, faced this dilemma since it was the inevitable consequence of his theory. We have noted how he felt he could not give much weight, or evidence, to the "inward conviction" of the mind on religious matters, because of its derivation from an animal state. But what applied to convictions and reasoning about religion applied equally to any convictions, or conclusions, of the human mind. ² What significance could be attached to them where the mind had been derived, not merely from an animal state, but by a process, allegedly, of random variation and natural selection? This reduced all theories and ideas alike, including Darwin's own about our evolutionary origins, to the same level of meaninglessness and unreliability. The mind could not be trusted to arrive at truth regarding the world and man.

If man's thinking powers derive at source from random molecular events, how is it possible to place any confidence in their cognitive claims and aims? If ... 'pure chance, absolutely blind' is at the evolutionary root of our mental equipment, how is it conceivable that true insight about our evolutionary past is achievable? By what process of 'angelization' could men have become cognisant of their random origins, and spectators of all time and existence as though from some superior and independent vantage point? Do the Neo-Darwinians, like many other system builders, desert the system of which they are the authors, claiming special cognitive privileges that cannot be justified within the system? Or alternatively, do they commit cognitive suicide. If our mental equipment has been formed and developed by non-rational processes, what possible grounds have we for trusting it when it infers, for example, that the chance hypothesis is the sole conceivable hypothesis? Reason totters and everything becomes logically permissible. There anarchy is loosed upon the world. ³

Richard Taylor argues in his book, Metaphysics, that we cannot both believe in the theory of the random emergence of man with his faculties for apprehending the world, and at the same time maintain that the information they convey to us about the world and ourselves is meaningful and reliable. He uses an illustration of a sign on a Welsh hillside, composed of stones, arranged so as to read:

¹ C.S. Lewis, Miracles, 29

² "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 animals, be trusted when it draws such grand conclusions?" C. Darwin, Autobiography (1876) in The Life and Letters of Charles Darwin, ed. F. Darwin, (1887) Vol. I, 313

³ R. Spilsbury, Providence Lost, 116

'British Railways welcomes you to Wales.' If those words are understood to convey a message, or a truth, they cannot be understood to have arranged themselves in that order by accident. On the other hand, if they have so arranged themselves then they cannot be taken to be meaningful.

John Hick regards this argument as fallacious because "we do not treat our sense organs, or our sense experience, as we treat a set of words, and therefore consistency does not require us to think of them, as we think of words in a sentence, as having been formed by deliberate intent. We know that sentences are normally expressions of human intelligence, because we ourselves so use them.. But we have no parallel reason to believe that our sense organs are products of an intelligent purpose".¹

Although Hick rejects the analogy between our sense experience and language, there is reason to believe that there is a resemblance between the two. What we are primarily concerned with are not the sense organs themselves, but the information and experience they convey to us about the external world. The organs of sense cannot, in this context, be separated from the mind which sifts, orders and interprets the data it receives by their means. In this respect interpreting the world is similar to learning and interpreting a language. As order and meaning emerge from the apparently arbitrary jumble of letters, in a sentence, so also man discovers order in the manifold data of the phenomenal world. The inconsistency of the ateleological view is that it accepts this information as significant and meaningful, and yet in the final analysis attributes all, the mind and the world alike, to the production of irrational forces.

The conception of order - of cosmos - attaches not merely to the external world, but also to the nature and capacity of the human mind to grasp that order, and to

¹ John Hick, Arguments for the Existence of God, 25

the underlying rapport between mind and nature which makes this possible. ¹

As F.R. Tennant put it,

If the world 'made itself', so to say, or is the self-subsistent Absolute, its adaptiveness to understanding has simply happened, and is part and parcel of the pluralist's last irrationality. It gives him more to explain or to refuse to explain: for why should the many arrange themselves to form an organic or intelligible whole? If, on the other hand, this be due to an intelligent Creator designing the world to be a theatre for rational life, mystery is minimized and a possible and sufficient reason assigned. ²

V

There are three other areas which demand our consideration with regard to man's rapport with his environment. The first is the existence of beauty, the second, man's moral nature, and the third his religious consciousness.

First, the existence of beauty. The presence of beauty in the world, and man's peculiar capacity to appreciate it, presents a difficulty for the Darwinian theory of evolution. Darwin was himself very conscious of this and sought to anticipate any objection to his theory from this quarter. "Natural selection", he wrote, "cannot possibly produce any modification in a species exclusively for the good of another species ... If this were so it would annihilate my theory." ³ The production of beauty in organisms for man's aesthetic appreciation, and not serving primarily the advantage of the organism itself, would be just such a case. Darwin, of course, could not deny a plenitude of beauty in the natural world.

¹ In a letter to Max Born, Einstein wrote, "You believe in a dice-playing God, and I in the perfect rule of law within a world of some objective reality which I try to catch in a wildly speculative way".

On this Karl Popper comments. "... Einstein's wildly speculative attempts to 'catch' reality are attempts to understand it ... (1) As we understand other people owing to a shared humanity, we may understand nature because we are part of it. (2) As we understand men in virtue of some rationality of their thoughts and actions, so we may understand the laws of nature because of some kind of rationality or understandable necessity inherent in them." K. Popper, Objective Knowledge, 184

² F.R. Tennant, Philosophical Theology, Vol. II, 105

³ Charles Darwin, Origin of Species, 152

His task was to account for it in utilitarian terms, as existing not for the benefit of man's aesthetic tastes, but for the survival of the species in which it was found. He sought to do this in two ways. First, he suggested that the primary purpose of beauty was for sexual selection. The beautiful and multifarious fronds of the peacocks tail had been fashioned over many generations by the inspection and choice of the peahen. Secondly, if beautiful arrangements and forms exist which can at present be shown to serve no useful purpose either in natural or sexual selection, we must assume that they did so at sometime in the past.

Regarding sexual selection, observation does not appear to confirm Darwin's view. No bird has more than the crudest visual aesthetic. Some birds, not songsters, do have a decided preference for bright objects, but their taste is vulgar. The magpie steals jewels, the bower bird decorates her bower with feathers dropped by other species, but works haphazardly, without any sense of pattern. It seems a pity that the most beautiful birds are thus unable to appreciate their own beauty, or rather each others' beauty.¹ But even if birds are credited with refined aesthetical taste it would appear that the theory of sexual selection as the means by which beautiful arrangement, pattern and colour are produced in a species rests upon an assumption. "An actual proof of the theory", wrote August Waismann, "is out of the question, if only because we cannot tell when a variation attains to selection-value ... we can only assume that slight intensifications of sexual characteristics give any advantage, and we must assume this otherwise secondary sexual characters remain inexplicable".²

The problem, however, for Darwinism resides in the superfluity of beauty that is present in organic nature. A mere blob of colour might be sufficient in a flower to attract an insect, but its beauty does not consist merely of that, but of the delicate arrangement and pattern of its petals. The intricacy and delicacy of the beauty that is found in organic nature seems to be far in excess of what is required merely for the purposes Darwin and others have assigned to it.

1 B. Viney, The Animal Kingdom, 60

2 A. Waismann, 'The Sexual Selection Theory', a contribution to Darwin and Modern Science, Ed. A.C. Seward, Cambridge, (1909), 49

Even if it were granted that every expression and detail of beauty in organic nature had been produced by the action of sexual selection, this would still not explain beauty away. It would simply mean that there was a greater affinity between man and the rest of the animal creation in this respect, that both have an innate appreciation of beauty and a consequent in-built rapport with nature.¹

However, in the case of man the whole subject is much more extensive, and is not confined to the appreciation of beauty in particular organisms, but is experienced in the whole panorama of nature, both organic and inorganic. This fact transcends the limitations of Darwin's utilitarian argument,² even if its truth and validity were granted. Man experiences beauty on a cosmic scale - in the splendour of the night sky, in the glory of a fine sunset, in the grandeur of mountains, rivers, lakes, and plains. Landscapes seen under snow, forests in autumn or spring, all minister to man's aesthetic appreciation of the world in which he is placed. None of these phenomena is attributable in their total and combined effect to the action of selection - natural or sexual. The utilitarian argument here has no relevance. It is true that the sole purpose of such phenomena is not beauty, but it is a dimension of nature that is so omnipresent as to raise in our minds the possibility that its presence in the world is not accidental. When this is coupled with the fact that man is equipped with the capacity for appreciating beauty and responding to what he finds in nature, the impression of purpose is strengthened.

1 Dr. Robin Baker of Liverpool University has recently put forward an alternative theory to that of sexual selection as an explanation of colouration in birds. He has termed it the 'unprofitable prey theory'. The flash of bright colour in a bird's plumage, he argues, is a warning to predators not to continue their pursuit. Bright colours, therefore, indicate prey which are difficult to catch, the more difficult to catch the more brightly coloured.
Nature Programme, B.B.C. Radio 4, March 1980.

2 Darwin acknowledges this rapport between man and nature. In the fragment of a note in "Old and Useless notes about the Moral Sense and some Metaphysical points written about the year 1837 and earlier," he states:
"I grant that the thrill, which runs through every fibre, when one beholds the last rays of sun and etc. etc., or grand chorus are utterly inexplicable - I cannot admit reason sufficient to give up any theory."
(91/7 Darwin Collection, Cambridge University Library).

This argument from nature as a whole has the force of reflecting back upon, and reinstating, the place and significance of beauty in particular organisms, for if it is conceivable that the world has been made a beautiful place for man to dwell in, it is also conceivable that particular organisms have been made beautiful in order that he should take a delight in them.¹ This is not to suggest that either nature as a whole, or the particular organism, are so solely for the sake of man, but it is to suggest that beauty is not merely accidental to nature, but has a significant part in it because man himself has a significant part in it.

Bird-song is one of those areas where nature comes closest to human culture and art. In her study of the Blackbird between 1962 and 1972 Joan Hall Craggs revealed that the bird had to work at its song to improve it, and make it more aesthetically attractive to the human ear, i.e., conformable to human aesthetic ideals of balance and movement.

If one records the song of a particular blackbird daily, throughout the singing season, changes of apparently aesthetic significance are detected. First, in the early part of the reproductive period, the song may appear highly functional; but later in the season, when the functional needs have been fulfilled, the song becomes organized more closely, and in a manner so nearly resembling our own ideas of musical form that it is difficult to deny that it is musically improved. So we appear to be moving towards the type which we call 'art music', where our experience of musical scores enables us to guess what kind of change is about to happen next. This sense of form seems to fit a number of bird songs in a most remarkable way. 2

There are many indications that bird song has more than 'survival value', and its approximation to human art, and conformity to aesthetic ideals, suggest a rapport between man and nature which is truly astonishing to anyone who has been taught to think of nature in ateleological and utilitarian terms.

1 Paley argues thus, "It being once allowed that such a purpose existed with respect to any of the productions of nature, we may refer, with a considerable probability other particulars to the same intention; such as the tints of flowers, the plumage of birds, the furs of beasts, the bright scales of fishes, the painted wings of butterflies, the rich colours and spotted lustre of many tribes of insects."
Natural Theology, 88

2 W.H. Thorpe, Purpose in a World of Chance, 51

It would seem, then, just as impossible to account for the presence of beauty in the world, and man's appreciation of it, solely in terms of the Darwinian ultimates of the struggle for existence and the survival of the fittest, as it was to do the same thing with the rapport between man's rationality and nature, or, for that matter, the organism and its inorganic environment. We have here another form of the same kinship between the environment and the human mind, which we have witnessed before in this argument.

Secondly, the argument from man's moral nature. Darwin considered that man's moral sense had evolved, as the instincts had evolved, in the struggle for survival. The 'good' is that which conduces to survival of the family or tribe. Thus as early as 1838 he was speculating in his notebooks,

May not moral sense arise from an enlarged capacity for being ... guided on strong instruction sexual, parental and social instincts, giving rise to 'do unto others as yourself', 'love they neighbour as thyself' ... the social instinct more than mere love - fear for others acting in union ... action, assistance and so on. May not idea of God arise from this confused idea of 'right' joined with necessary action of 'causation'...¹

Darwin's ideas of moral sense developed very little after that time. His views in The Descent of Man, first published in 1871, were taken directly from the early notebooks.² His ethical theory was utilitarian and naturalistic.

I am tempted to say that those actions which have been found necessary for long generations (as friendship to fellow animals in social animals) are those which are good and consequently gave pleasure, not as Paley's rule is, those that in the long run will do good - alter will in all such cases to have and origin as well as rule will be given.³

1 Chas. Darwin, Note Book 'M' commenced July 15th, 1838, finished October 2nd. 1838, Darwin Collection, Cambridge University Library.

2 When writing The Origin and The Descent Darwin went through his early notebooks and extracted everything he thought relevant and useful, even to the point of cutting out the pages he felt he could transcribe. Quite a few pages relating to 'moral sense' have thus been removed from the notebooks for The Descent of Man.

3 Chas. Darwin, Note Book 'M', 132, Darwin Collection.

This theory, however, seems to lead Darwin into what G.E. Moore defined as the 'naturalistic fallacy' i.e. the idea that what is good can be explained wholly in terms of natural constituents, such as, pleasure, conduciveness to survival, and so forth. The concept of 'goodness', Moore contended is a simple, unanalysable quality and cannot be defined without remainder in terms other than itself. If this could be done then the resulting statement would be a tautology, for 'pleasure is good' would really be 'pleasure is pleasure'. However, when Darwin and those who followed him affirmed that what was conducive to survival was 'good' they did not consider themselves to be uttering a tautology, but making a significant and synthetic statement. The notion of good, therefore, transcends the reductionist argument of Darwin on moral sense.

Darwin's argument in The Descent of Man is that the individual's social instinct (which is synonymous with conscience) and sympathy identify him with the tribe or group. Their approbation of his conduct is most important to him therefore the social instinct becomes highly developed. Because of man's powers of reflection this need for acceptance by the group becomes stronger than other, competing instincts, such as hunger and sexual desire, and creates a sense of unease and dissatisfaction if it is not followed. Thus, we have the emergence of remorse and repentance when another instinct is followed which conflicts with the social instinct. However, this description and analysis of warring instincts does not explain the origin of a sense of duty or obligation to obey a moral imperative, no more than an account of conflicting forces in nature would give rise to a sense of what 'ought to be the case', or what 'ought to be done', except as a derivative from the concept of 'duty' and 'oughtness', which stand in their own right as unique to the moral consciousness of man.

The concept of 'oughtness' cannot be deduced from indicative statements of what is the case. That a course of action is necessary for this or that result to follow does not carry with it the moral sanction that I ought to do it.

A sense of duty cannot arise from any merely factual description of the world or human nature, or man's place in the world. A sense of goodness, rightness and obligation belong to a different order of things and are apprehended by the moral nature of man, and defy definition in, and reduction to, naturalistic terms. ¹

Kant, Bishop Butler, the Cambridge Platonists, have all in their different ways affirmed the irreducible character of man's moral nature, and of morality itself. In his apprehension of moral values man transcends nature, and it was this transcendence of man over nature that precipitated the conflict for some of Darwin's followers between his theory and their understanding of man's moral nature and destiny.

The problem for Huxley, as we noted in the previous chapter, was that man's moral nature, his ideals and aspirations, were so much higher and better than the process of natural selection and the law of the jungle which had, according to Darwin, given rise to mankind, that a fundamental conflict was created between the two. Darwin himself acknowledged that the obedience of civilized man to the dictates of conscience resulted in the preservation of the weak, the sick and the maimed members of society, and the propagation of their kind, something quite contrary to the laws of natural selection. "Excepting in the case of man himself, hardly anyone is so ignorant as to allow his worst animals to breed." ² Huxley appears to be rebelling against a paradox which is inherent in the Darwinian theory, and that is the idea that the purposive is dependent upon the non-purposive, the rational is the product of the non-rational, and man's moral nature is explicable in terms of the amoral. Here it would seem, to borrow a phrase from Rudolph Otto to whom we shall later refer, that darkness is invoked to illuminate light.

1 "The conclusion of most philosophers of ethics that it - [the evolutionary process] cannot generate ethical norms being guilty of the 'naturalistic fallacy' of deducing what ought to be the case from what is, has not deterred a succession of biologists, such as Julian Huxley and C.H. Waddington from urging not merely the relevance of, but the decisiveness of biology for ethics." A.R. Peacocke, Creation and the World of Science, 1979, 176

2 Chas. Darwin, The Descent of Man, 206

The a priori and autonomous character of man's moral consciousness is used in the theistic argument to point to the existence of God. As Butler put it, "There is a superior principle of reflection or conscience in every man ... which magisterially exerts itself ... and which, if not forcibly stopped, naturally and always of course goes on to anticipate a higher and more effectual sentence which shall hereafter second and affirm its own".¹ Such evidence as conscience affords can, as A.E. Taylor has pointed out, because of its factual character - because it is a felt authority - convert belief in God from a "mere hypothesis" into living faith. But we are not ourselves concerned here with that aspect of the argument from man's moral nature. We are simply concerned to invoke it as yet another example of conspiracy, of the adaptedness of man's nature in its totality to the world in which he is placed. Just as man has an innate capacity for language and aesthetic appreciation, so he also has within him, in a way that is not explicable in naturalistic terms, a faculty for discerning what is good and right, and an awareness of what he ought to be and do. Of course, it is subject to education and instruction, and is informed by the empirical facts of the world in which we are placed, but it would appear that it is itself an ultimate and irreducible fact of man's nature, only properly intelligible within a teleological interpretation of man and the world.

Thirdly, the argument from man's religious consciousness. A further point of rapport between man and nature may be found in man's religious consciousness. Not only does nature evoke in man a response to its beauty, but there is also that in nature which evokes in him a sense of the numinous. Darwin confessed that he had been most acutely aware of such a religious feeling when he was in the great rain forests of South America. Perhaps the fullest exposition of the argument for such an a priori religious sense is to be found in Rudolph Otto's Idea of the Holy. There Otto argues that the category of the holy is not to be confused with any of the empirical circumstances which occasion its manifestation in experience, and which serve to give it content.

¹ T.A. Roberts (ed.) Butler's Fifteen Sermons, 31

The facts of the numinous consciousness point therefore - as likewise do also the 'pure concepts of the understanding' of Kant, and the ideas and value-judgments of ethics and aesthetics - to a hidden substantive source from which the religious ideas and feelings are formed, which lies in the mind independently of sense experience.

Furthermore, Otto contends, the religious sense is ultimately irreducible to naturalistic terms, the evolutionary argument is incapable of explaining its presence in man's make up and experience. Out of nothing nothing can come. If we propose to explain nature in terms of its ultimate forces and laws, how can we then go further and explain the laws themselves? In what terms shall we explain them? Likewise, when we investigate man's nature and experience we must presuppose the spirit, "the reasonable spirit of man with its predispositions, capacities, and its own inherent laws." ¹ This cannot itself be explained. We cannot say how mind and spirit are made.

The history of humanity begins with man, and we have to presuppose man, to take him for granted as he is, in order that from him we may understand his history. That is, we must presuppose man as a being analogous to ourselves in actual propensities and capacities."

The business of trying to explain man's present consciousness in terms of some sub-human original, Otto regards as a hopeless enterprise and, even if it were not, we should still need to start with man as he is, since anything else is an attempt to interpret animal behaviour in terms of clumsy analogies with the human mind.

To try to understand and deduce the human from the sub-human, or brute mind is to try to fit the lock to the key instead of vice versa, it is to seek to illuminate light by darkness." ²

Thus, in Otto's view, we are faced with the ultimate fact of man's religious consciousness, which must be evaluated in its own right. This religious consciousness is found to be in rapport with nature. Nature quickens and evokes from the soul of man an awareness of that which transcends nature. The empirical circumstances - the mountains, the forest glade, the vastness of the open prairie - call forth the numinous in man's experience. But these are only the occasion of the manifestation in his consciousness of that which is qualitatively different from anything that 'natural' sense perception is capable

¹ R. Otto, Idea of the Holy, 131

² Ibid.

of giving. Yet natural objects are themselves of such a character that they are capable of evoking this experience. The world becomes the vehicle of a glory which touches and glances from it when it is brought into relationship with the soul of man. The Biblical expression of this is "For the invisible things of him (God) from the creation of the world are clearly seen in the things which are made even his eternal power and Godhead." ¹ The empirical world becomes, in relation to man, the bearer of values, and the occasion of a revelation of power and glory which it seems designed to produce. Man appears strangely dovetailed into a world which by a remarkable conspiracy of circumstances, ministers not merely to his physical needs, in common with all other living things, but also seems to be adapted to his intellectual, moral and religious nature in such a way as to excite wonder at the affinity and rapport that exists between him and nature.

To argue thus is not to maintain a crude anthropocentrism, which has sometimes disfigured the design argument in the past, when every detail of nature and the universe was often considered to be created solely for the needs and convenience of mankind, as for example Buckland argued in his Bridgewater Treatise, when he stated that the course of the rivers and the deposition of coal and ore had been conveniently arranged for the development of towns and cities. It is possible to consider that man has a place, and an important place in nature, without arguing that everything has been brought into existence solely for him. Sir Charles Bell, in another of the Bridgewater Treatises, expressed the matter in a more balanced and judicious way. We presume too much when we say that light has been created for the purpose of vision. We are not entitled to pass over its properties as a chemical agent, its influence on the gases and, in all probability, upon the atmosphere, its importance for vegetation, animals, and its function in the universe as a whole.

¹ Romans, 1:20.

Instead of supposing light created for the eye, and to give us a sense of vision, would it not be more conformable to a just manner of considering this subject to dwell with admiration on the fact, that this small organ, the eye, should be formed with relation to a creation of such vast extent and grandeur, and more especially that the ideas arising in the mind through the influence of that matter and this organ, should be constituted a part of one vast whole ! ¹

It is, indeed, this which excites man's wonder and admiration. We do not contend that everything was made solely for the benefit and convenience of man. As A.E. Taylor has said,

To accept the principle of the 'argument from design' commits us neither to holding that man is the one end of all the purposes of God, nor imagining that we know fully what God's purposes for man are. ²

There is no need to confuse and prejudice the design argument by that caricature of itself. What, however, we do recognise is a remarkable affinity, or kinship, between this infinitely complex physical, rational, moral and spiritual being which is man, and the equally complex and mysterious universe in which he is placed.

1 Charles Bell, 'Bridgewater Treatise', The Hand: Its Mechanism and Vital Endowments as Evincing Design, 6 & 7

2 A.E. Taylor, Does God Exist ? 75

THE STRUCTURE AND CHARACTER OF THE
DESIGN ARGUMENT AND ITS ROLE IN
CONTEMPORARY APOLOGETIC

I

THE STRUCTURE AND CHARACTER OF THE ARGUMENT

First, we must notice two basic principles underlying the argument which give it a special character.

(i) The argument from design presupposes an intuition - the recognition of purpose and design in artifacts or organisms. The Darwinian argument does not deny that organisms resemble artifacts in having the appearance of design, but it attributes the appearance of design to chance. Thus the human mind which is itself capable of making tools and machines which exhibit design and purpose has the power of recognising the appearance of design in natural objects. Indeed, it is found to be impossible to get along without this concept of design when dealing with organisms. In theory it may be excluded, as it has been by Darwin and his followers, but in practice the idea reasserts itself. It does so, as we noticed, in the terminology of Darwin, when speaking about nature. Much of what he said about the powers of natural selection, if transposed into the idiom of theism would sound an orthodox note. However carefully and deliberately it is resolved to exclude the concept of design from our reckoning when dealing with nature, it seems to have the power of reasserting itself almost immediately.

Jacques Monod, in his recent book Chance and Necessity, discusses this paradox. Speaking of what appear to be compelling indications of design in the molecular structure and function of organisms he states,

It is the very existence of this purpose, at once both pursued and fulfilled by the teleonomic apparatus that is the 'miracle'. Miracle? No, the real problem lies at another, deeper level than that of physical laws; it lies in our understanding, in our intuition of the phenomena. There is really no paradox or miracle, but a flagrant epistemological contradiction. 1

According to Monod the apprehension of organisms under the principle of design is illusory and meaningless. However, it has a remarkably tenacious hold upon the mind, for he goes on,

Objectivity nevertheless obliges us to recognise the teleonomic character of living organisms, to admit that in their structure and performance they decide on (sic) and pursue a purpose. Here, therefore, at least in appearance, lies a profound epistemological contradiction which, if it is only apparent, must be resolved, or else proved to be radically insoluble, if that should turn out indeed to be the case. 2

Monod wishes to resolve the paradox by denying one side of it - the attribution of purpose, or design, to organisms. But as he himself has shown the determination to do this does not necessarily ensure its success. Perhaps it is insoluble. Kant considered it to be incapable of resolution. He posed precisely the same problem. How can a mechanical and teleological explanation, or account, of organisms be given without contradiction, and he concluded that they must be held together in tension. We must live with the antinomy or paradox. The idea of design is regulative of our thought about nature, the mind of man is so constituted that he cannot but think of organic nature in this way and conceive it under these terms. Kant rejected the notion that design can be excluded from our thinking about nature, experience shows that it cannot. The resolution of the paradox by the assertion of chance Kant regarded as unsatisfactory, since it denies or destroys the concept of teleology without explaining it. Thus it would appear that design remains a fundamental idea or intuition of the human mind.

It is from this recognition, this basic intuition, of design that the design argument takes its beginning. Paley assumed that aspect of the argument to begin with. The foot striking first against the stone and then the watch on the heath and the consequent examination of both, presupposes the intuitive

1 J. Monod, Chance and Necessity, 29

2 Ibid., 31

recognition of the difference between an object that manifests design and one which does not. "We perceive in the watch", says Paley, "what we could not discover in the stone, that its several parts are framed and put together for a purpose".¹ But this 'perception' of design is not deduced from the object by reasoning. It is assumed as the only condition under which we can reason on such subjects at all. The object is the occasion not the cause of our thinking in terms of design. Had we never seen such a thing as a watch before, it would be possible to discern in it the evidence of design.

Unsolicited testimony to the intuitive character of our recognition of design is given by Hume, "... the idea immediately flows in upon the mind with a force like that of a sensation"² (Cleanthes in The Dialogues). And Darwin, "It often strikes one with an overwhelming force"³, (in conversation with the Duke of Argyll). However far we may go in the direction of a mechanistic account of nature we can, it seems, never exclude the concept of teleology. The constitution of the human mind is such that it views nature in this way, through the primitive and basal perception, or intuition, of design.

(ii) The idea of design is sharpened and vivified when the mind entertains examples and illustrations of design in nature. This is where we see the role of the argument in creating a cumulative impression by the citation of instances of organisms in which design is exemplified. Paley's argument consisted principally of such examples once the simple exposition of it had been given in the first few pages. Both Kant and Hume recognised that this intuitive awareness of the mind is strengthened and refined when it rests upon particular examples. Thus Kant put it, "The mind tears itself out of depression and doubt about design, suggested by scepticism, the moment it casts a look upon the wondrous forms of nature and the mystery of the universe."⁴ Hume, through the person of Cleanthes, concedes that the beauty and fitness of final causes

1 W. Paley, Natural Theology, Works, 25

2 D. Hume, Dialogues concerning Natural Religion, (Ed.) N.K. Smith, 191

3 F. Darwin, (Ed.) Life and Letters of Chas. Darwin, Vol. I, 316

4 I. Kant, Critique of Pure Reason, to J.M.D. Meiklejohn, (1934), 363

strikes us with overwhelming force, and this self-evident impression of design is deepened and strengthened when the mind contemplates specific examples, such as the eye.¹

Paley himself was not satisfied with the bare statement of the argument, with the mere logical inference. The force of the argument, he insisted, lies essentially in its impressionistic character. It must be felt and imbibed into the system, like a medicine, before its true efficacy is experienced.² Thus the argument had to be clothed with specific examples of design to produce the desired effect upon the mind and imagination. By the cumulative influence of examples and illustrations a merely notional assent becomes a real assent. Real assent depends upon the intensity of the impression made upon the imagination. Thus the exposition of the argument is essential if its bare propositions and inferences are to be transformed into concrete expression and have their proper influence upon the mind. Its effect is not produced "by a few steps of reasoning," like the demonstration of a geometrical theorem, the impression is suggested by the contemplation of every part of nature. All this is fundamental to our understanding of the nature of the argument from design. In this respect the term argument is itself somewhat misleading since it may be assumed that its essence can be captured in a syllogism. It is not, however, so much a question of premises and conclusion, but more of instances and intuition.

Any one type of illustration, or example, of design is not essential to the argument, and may be changed according to the taste and scientific predilection of the age. Thus Paley drew his instances of design from the macrocosm of organic nature. Today it is expedient to draw them from the microcosm, from the molecular and genetic structure of the organism, for it is to that area scientific thinking has moved and popular interest has followed.

1 D. Hume, Dialogues concerning Natural Religion, 191

2 W. Paley, Natural Theology, Works, 192

Next we need to recognise the resemblance between the nature and character of the design argument and that of Darwin. This basic affinity is fundamental for any understanding of the antithesis that Darwin presents to the argument from design, and the opposition that exists between them. Evolution itself starts with an intuitive principle, which is the unity and derivation of all organic forms traced by uniformity, or analogy. The mind is constantly synthesizing the phenomena it perceives, and comprehending the world of natural and artificial objects according to the principles of analogy and uniformity. This was true of the study of nature long before Darwin. A chain of being of all living things was conceived as linking the organic creation together and impressing the mind with a series - a gradation from one state of being to another.¹ The only difference between this conception of nature and Darwin's was that he introduced movement and the dimension of time into this understanding of organic nature. He also appealed, in consequence, to an imaginary series in the past which filled the ostensible gaps in the chain of living beings. This was his conception of the 'tree of life' in which the bases of the branches are now dead or missing - the coral reef with the base of the coral branches hidden beneath the sea.

Darwin's thought was greatly influenced by Lyell and the concept of gradualism, or uniformitarianism. The result of Darwin's reading of Lyell was that he saw that the concept of gradualism could be used to unify and bring together the whole organic realm in one unbroken chain of induction and descent. When he lighted on the principle of natural selection by reading Malthus, he had obtained the means by which the imagination could be assisted in filling in the gaps which existed. Darwin's testimony to Lyell's work was that it altered the whole tone of one's mind and way of seeing things, and he added, "I always feel as if my books come half out of Lyell's brain". Thus the intuitive power of the mind to grasp things as a whole, and the concept of uniformity, were given a new impetus by Lyell and subsequently by Darwin.

¹ See Appendix II.

But while the mind has this natural tendency to group things together and to comprehend them under a plan of unity, it is not in this respect an infallible guide to be followed blindly. Francis Bacon warned that

the human intellect, from its peculiar nature, easily supposes a greater uniformity and equality in things than it really finds. And though there are many things in nature unique and full of inequality, yet it feigns parallels and correspondents and relations which do not exist. Hence the figment that in the heavens all things be moved through perfect circles.¹

The intellectual bent of the mind to synthesize and integrate phenomena is undeniable, but the empirical facts must be respected, the discontinuities and singularities of the world cannot be ignored. While in pure speculation the tendency of the mind to comprehend reality in an infinite series of gradations and relations is theoretically possible, in fact and in practice, in its application to the natural world, the proclivity may be indulged only so far as the facts permit, i.e., only so far as it can be ascertained that the uniformity and homogeneity prevail.

Darwin, as we have shown, could acknowledge no limit, and once the mind and imagination had been set in motion he could find no stopping place.

If the two arguments viz. design and descent through natural selection, so resemble each other are they simply different metaphysical views of the world? Does it matter ultimately whether one chooses a teleological or an ateleological view of reality? Has one view more to commend it than the other? A teleological account of the world may be regarded as superior for the following reasons.

(i) The mechanistic view cannot exclude design. Darwin attempted to do so. He was against evolution by saltation, the view of the Vestiges, because the adaptation of the organism to its environment would then not be explicable on

¹ F. Bacon, Novum Organum, 145, tr. G.W. Kitchin, 21

mechanical or naturalistic grounds, and the correspondence could only be explained by a miracle. He was against any intervention of the Deity, or directed evolution in any form, for this would destroy the significance and role of natural selection. As Darwin saw it design was fundamentally incompatible with his theory. But in the long run, it was impossible of him to exclude design altogether. Unless he undertook to explain the origin of life, something that the theory of natural selection was not equipped to do, he had to posit the existence of one or a few forms from which all other organic forms had derived. Those critics who confronted Darwin with this problem should have enabled him to see that design cannot be wholly excluded and that if it is admitted at all there is no difficulty, in principle, in admitting it at any point at which it affords a coherent and elegant explanation of a particular phenomenon. When Harvey raised the question whether Darwin's original few forms were created as eggs or full grown, Darwin replied with what he considered to be the most amenable solution for the imagination. "I find ... less difficulty in imagining the creation (sic) of an asexual cell increasing by simple division".¹ The modern scientist tells us that the complexity of the simplest cell is such as to stagger the imagination. "All the cells that we know are of fantastic complexity. I believe that no biologist or physicist has yet been able to propose even the outlines of a theory as to how such a cell might have been 'evolved'."² The avenue of regress to ultimate simples seems to be closed with greater finality now than for Darwin. The mere assertion that the complex machinery of a 'simple' cell must have emerged tells us nothing. Jacques Monod writes, "The simplest cells available to us for study have nothing simple about them". How they could have come about he finds almost impossible to speculate.

The development of the metabolic system which, as the primordial soup thinned, must have 'learned' to mobilize chemical potential and to synthesize the cellular components, poses Herculean problems. So does the emergence of the selectively permeable membrane without which there can be no viable cell. But the major problem is the origin of the genetic code and its translation mechanism. Indeed, it is not so much a 'problem' as a veritable enigma. The code is meaningless unless translated. The modern cell's translating machinery consists of at least fifty macromolecular components which are themselves coded in DNA: the code cannot be translated except by products of translation. It is the modern expression of anne vivum ex ovo. When and how did this circle become closed? It is exceedingly difficult to imagine.³

1 F. Darwin (Ed.) More Letters of Chas. Darwin, Vol. I, 163

pp. 134 & 135.

2 W.H. Thorpe, Purpose in a World of Chance, 21. 3 J. Monod, Chance & Necessity.

As Monod himself recognises, without the help of fossils we shall never know. Such fossil evidence does not exist and presumably will never come to light. In the face of this impasse we have no alternative but to choose between a naturalistic, mechanistic explanation, or a teleological one. The naturalistic explanation cannot, at the boundary of organic life, appeal to the principle of natural selection, since that only operates within it. Therefore to assert a mechanistic explanation here is to do so only because a teleological explanation is unthinkable, and it is unthinkable not on scientific but metaphysical grounds. Yet the teleological explanation of such organized complexity and purposive arrangement as we are confronted with in a 'primitive' cell, would appear to be more cogent, fitting and reasonable than a purely naturalistic explanation.

The regress argument was thought to get rid of design but it does not work. It merely pushes the problem a stage further back, it removes it from the macrocosm to the microcosm. In the former it was a palpable problem for Darwin which he believed he had resolved but he had, in fact, only succeeded in sweeping it out of sight. Now it returns with our more detailed knowledge of the micro-organism.¹ Kant's judgement would, despite all the changes of the past two hundred years, appear in principle to be sound: organized matter is qualitatively different from inorganic matter and cannot be explained without remainder by mechanistic principles. Organic substance must, according to Kant, be the starting point for physical explanations of their formations. To suppose that crude matter obeying mechanical laws was originally its own architect, that life could have sprung up from the nature of what is void of life, and matter have adopted the form of a self-maintaining purpose, was in his view contrary to reason.²

¹ Bacon argued that "a little or superficial acquaintance with Philosophy (science) may incline the mind of man to Atheism, but the farther proceeding therein doth bring the mind back again to religion: for in the entrance of Philosophy, when the second causes, which are next unto the senses, do offer themselves unto the mind of man, if it dwell and stay there it may induce some oblivion to the highest cause; but when a man passeth on farther, and seeth the dependence of causes, and the works of Providence; then according to the allegory of the poets, he will easily believe that the highest link of nature's chain must needs be tied to the foot of Jupiter's chair. (F. Bacon, The Advancement of Learning, 8)

² I. Kant, Critique of Teleological Judgement, 85 & 86

(ii) A naturalistic theory cannot surmount its inherent limitations and adopt those principles that belong logically to a teleological explanation. We have pointed out that the purely mechanistic hypothesis contains an inherent paradox, viz., the dependance of the purposive upon the non-purposive, the rational upon the non-rational, and the endowment of unthinking processes with the power of producing thinkers. Darwin himself slipped into the use of teleological language to describe the working of natural selection. This did much to soften the paradox and to disguise the character of the achievements he attributed to it. The amalgam of teleological language and mechanistic views cushions from the mind the shock of explanations which are more extraordinary than the phenomena themselves.

At times it struck Darwin himself as strange and untoward that such blind processes as he had described should be capable of such amazing results, that the world of animals, insects, and vegetation as we know it, should be the result of the "struggle for survival". But that is only part of the mystery. The greater part is that man's mind should also be supposed to be the product of such processes. Monod has recently written,

When one thinks about the tremendous journey of evolution over the past three thousand million years or so, the prodigious wealth of the structures it has engendered, and the extraordinarily effective teleonomic performances of living beings, from bacteria to man, we may well wonder whether all this might not be the product of a vast lottery, in which natural selection has blindly picked the rare winners from among numbers drawn at utter random ... As Francois Maurice wrote, 'what this professor says is far more incredible than we poor Christians believe'. 1

A teleological explanation contains no such paradox. If we believe in an act of creation - in the bringing into being of a complex entity manifesting design - the power that is associated with such an act, the power of an intelligent Creator, is appropriate to the result. Here we may employ the other side of Hume's argument: Not only is the cause inferred not to exceed the effect, but also it must not be less than is required to produce the effect.

1 J. Monod, Chance and Necessity, 131

The fundamental phenomenon of design in the universe requires that we infer a cause sufficient to it. A teleological explanation in terms of an intelligent Creator is both reasonable and commensurable with the result, as the case demands.

(iii) One example of design is, in principle, sufficient for the design argument but presents difficulties to the Darwinian argument. The existence of disorder cannot overthrow, or detract from, the significance of order where it is found. It still points to the existence of intelligence and personality which must give rise to it. If, for example, one and only one artifact were found on the surface of Mars, the entire absence of any other would not destroy the evidence for the existence of an intelligence which was responsible for it. Kant argued in a similar vein when he wrote,

Given but a single organized product of nature then the structure of our cognitive faculty is such that the only source which we can conceive it to have is one that is the cause of nature itself - be it of entire nature or even only of this particular portion of it - and that derives from our understanding the requisite cause for such a product. ¹

Thus the teleological explanation can be said to occupy a stronger position than the mechanistic one. An ateleological view of the world cannot be established until it has been shown conclusively that no examples of design exist, and as Monod rightly says, "It is obviously impossible to imagine an experiment proving the non-existence anywhere in nature of a purpose, of a pursued end." ² A mechanistic hypothesis may be adopted for limited areas, but not for the whole. A single example of design in nature, such as the complex structure of the 'simplest' cell, is, on the other hand, sufficient to establish in principle the argument from design.

(iv) It would appear that a mechanistic hypothesis, such as Darwinism, is not equipped to be an alternative metaphysic or world view, since not only can it not exclude the teleological view of nature, as we have seen, but also it does not take account of the tendency of the human mind to view nature in purposive

¹ I. Kant, Critique of Teleological Judgement, 101

² J. Monod, Chance and Necessity, 31

terms. As Kant has put it, "We cannot get home without it." The conception of organic nature in teleological terms is an indispensable component of human thought about the world. ¹

Monod considers, like many others before him, that the teleological view must be excluded if the integrity of science is to be preserved. We discover in nature a high degree of teleonomic efficiency and adaptation. The apparatus and organization of the biochemistry of organisms is "entirely logical, wonderfully rational and adapted to its purpose, to preserve and reproduce the standard norm . . . It is the very existence of this purpose at once both pursued and fulfilled by the teleonomic apparatus that is the 'miracle'". But, in fact, Monod argues, there is no miracle. The problem of teleology lies not in the phenomena and the physical laws, but in the mind - "in our intuition of the phenomena there is really no paradox, or miracle, but a flagrant epistemological contradiction." ²

The corner-stone of science, Monod insists, is objectivity, that is, the "systematic denial that 'true' knowledge can be reached by interpreting phenomena in terms of final causes, that is to say, of 'purpose'". This postulate of objectivity is inseparable from science. Its whole development over three centuries presupposes it. It is impossible to escape from it without departing from science itself. Hence, he concludes the contradiction must be resolved by the exclusion of teleology, modern man must accept not only the fruits of science in technology and mastery of nature, but he must accept the metaphysical implications of science, too, in recognizing that he lives in a world of chance and necessity - a universe that is devoid ultimately of purpose and in which he must create his own destiny instead of accepting one he finds in it.

There are two mistakes which it appears Monod makes here which involve him in his epistemological contradiction and require him to resolve it in the way he does.

1 I. Kant, Critique of Teleological Judgement, 91

2 J. Monod, Chance and Necessity, 29

1. He elevates the methodology of science into a metaphysic. There is no reason why he should do this except out of personal predilection and choice of such a metaphysic. Science itself does not require the kind of justification he considers it demands. Kant would have argued that the mechanistic hypothesis must be pursued to the limit, but this would not have necessitated the ousting of the teleological principle from our consideration of nature. It is the pre-supposition of objectivity that Monod rightly says science needs, but there is no reason why this should become a metaphysic except by choice.

2. He assumes that the only true knowledge is empirical knowledge. However, this legacy of the Enlightenment confuses our appraisal of the world and ourselves, and circumscribes man's real potential. Knowledge extends beyond these narrow confines and life would be impossible if it did not. My knowledge of my own states of mind, and of other minds, does not fall into this category.¹

On these grounds the teleological principle cannot be excluded. The denial of this principle, in the way that Monod advocates, can only result in the impairment of man's ability to interpret reality, and the impoverishment of his appreciation of it. The adoption of the explanation of chance whether by Epicurus or the modern Darwinist is, as Kant would have maintained, the resolution of the antinomy in the wrong way, by destroying the concept of teleology rather than explaining it.

In dealing with mind we are aware that we are encountering something that is fundamentally different in principle from matter, even organic matter. Likewise in dealing with organized matter we are aware that we are dealing with something that is qualitatively different from inorganic matter. Neither of these two can be explained without remainder by the mechanistic principle and, therefore, any attempt to interpret reality solely in terms of such a principle must ultimately fail.

¹ See discussion Chapter II.

(v) Wherever the teleological principle is denied it tends to reassert itself. Because man and organic nature cannot be understood adequately without teleological categories this leads to the conviction that the whole of nature must ultimately be purposive. The necessity of viewing particular parts of nature as purposive reflects back upon nature as a whole, and it becomes impossible to conceive of the world as having no purpose at all. Kant argued that the mind is led on, not only to recognise intrinsic purposiveness in the forms which manifest it, but to see relative purpose in the natural world as a whole, and finally to adopt the assumption that the universe depends on, and has its source in, an intelligent being which exists outside the world (that is, in logical not spatial terms) and that teleology thus can find no completion of its enquiries except in a theology.

Those who have denied the teleological principle have found it difficult to maintain that position consistently. Even Darwin could not rest in a purely mechanistic interpretation. While he advocated the operation of chance and natural selection in the production of organisms, he admitted that he was reluctant to believe that the whole world was without purpose.

Likewise, we have noticed how both Wallace and Huxley, despite their espousal of the mechanistic view, found it impossible to remain in that position to the complete exclusion of the teleological view. Wallace went on to affirm a purpose for man that was independent of the principle of the 'survival of the fittest'. In other words the purely objective, scientific, appraisal of man was found inadequate to comprehend his whole nature. And similarly Huxley retreated from the full implications of the doctrine of natural selection when it came to the consideration of man's moral nature.

As Monod has pointed out, man has never, in fact, really accepted the full implications of the mechanistic hypothesis - he has never wholly embraced the view that the world is amoral and purposeless. The Darwinian theory of evolution was accepted, but without its essential constituent - natural selection.

People wanted evolution - directed evolution - but not natural selection with its attendant metaphysical implications of chance and the denial of purpose. The reason for this was, one suspects, not just a distaste for a theory which presents the world as cold and inhospitable to man. There is surely a deeper reason, which is that the mechanistic hypothesis is ultimately inadequate to the task assigned to it. It was never meant to provide us with a rival view of the universe, but was, in the first instance, a tool of science, a methodology, but not a weltanschauung. When exalted to a metaphysic it proved incapable of meeting the deeper needs and comprehending the subtle nuances of the natural world and human existence. Hence its ultimate inability to take permanent hold of the human mind.

II

The Role of the Argument

In considering the role of the argument from design in contemporary apologetic we must first refer to the negative side.

(i) It is not a demonstration of the existence of God. It is not an incontrovertible proof of an all-powerful, all-wise and benevolent Deity. That was the significance of the philosophical criticism. The analogy holds between artifact and designer, and evidence of design in the natural world and creative intelligence, but it does not take us all the way to the infinite Creator of Christian orthodoxy. A man is not a knave or a fool because he cannot accept its conclusion, as Clarke would have said he is. But there is nothing unreasonable about the nature of the argument. Its strength does not lie in its power to demonstrate or prove, indeed, were that the case it would be unsuited for its purpose, which is to appeal to the whole man - to his will and emotions as well as to his mind.

There is something else about the argument from design which Kant implicitly recognised, that is, the intuitive element which is quickened by its rapport with the world of nature. Its cumulative effect upon the imagination serves to create upon the mind the impression that the world and man are designed, and

to draw the will and emotions to embrace this conviction. This effect could not be produced if the argument were purely ratiocinative. The heart and will would not be moved, nor the imagination kindled, by the demonstration of a mathematical theorem. Philosophical criticism in revealing the limitations of the argument, also revealed its true and proper nature. Or rather, one should perhaps say that philosophical criticism rescues us from misunderstanding of the nature of the argument, setting it forth in its real character, and freeing it for its proper role. In depriving the argument of its supposed powers of demonstration, which serve no real purpose, it at the same time enables us to discern the means by which the argument can become truly efficacious. Thus philosophical criticism performs a real service in enabling us to understand the role of the argument.

(ii) The design argument is a preparation for revealed religion, but not the foundation of it. The contemplation of nature, and human nature, under the intuitive principle of design, creates in man an appetite which natural religion itself cannot satisfy; a spirit of enquiry is evoked which impels him to go in search of a Creator, to look for, and expect a communication between himself and God which will answer the quest that has been awakened within him. Thus Christianity as a revealed religion must stand in close relationship to natural theology while not resting upon it as a foundation.

Kant saw the role of the argument for design as a propaedeutic for theology proper, "physical teleology urges us to go in search of a theology". In Kant's case it was a theology based upon man's moral nature, not a revelation. However, his remarks are of interest in this respect, that a natural theology is not an end in itself. The value of a physico-theology, he maintained, lies not in its power to establish conclusively the existence of God, for this it has been shown not to possess, but rather in the way in which it prepares the mind for theological cognition. It gives a bent and direction to the mind which is then open to revelation, and will in consequence serve as a powerful confirmation and corroboration of revelation when it is given.

Paley, himself, was aware of this limited role of natural theology and of its proper function in relation to revelation. His aim in his Natural Theology was "to provide a limited confirmation of the Christian religion." "A true theist," said Paley, "will be the first to listen to any credible communication of divine knowledge".¹ Conversely, without the theistic direction which natural theology gives we may expect a general lack of interest in revealed religion.

Dennis Nineham has posed the modern theological problem thus,

No one will deny that it is at the level of the imagination that contemporary Christianity is most weak. Men find it hard to believe in God because they do not have available to them any lively imaginative picture of the way God and the world as they know it are related.²

It is at this level, the level of the imagination - the picture of the relation between God and the world - that the design argument operates, and it would therefore seem that a revival of religious interest generally would be greatly assisted by a renewed interest in natural theology, and particularly by the refurbishing of the argument from design, that "oldest, clearest, and best suited to human understanding" of all the arguments for the existence of God.

(iii) The argument from design, rightly understood, creates not only an intellectual quest for a Creator, but it also puts man under a moral obligation to seek him. At the purely logical level the design argument is insufficient. The tendency in the eighteenth century was to regard the exposition of the argument simply as an intellectual pursuit. But man is more than mind, and the relationship presupposed by this argument is between man and his Creator. This calls forth another dimension - the moral.

The man who is ignorant of someone who does him good, should at least desire to know something about him. A man who received many gifts from an unknown source would show a lack of conscience if he did not show some desire to know something

1 Wm. Paley, Natural Theology, Works, 193

2 Dennis Nineham in The Myth of God Incarnate, ed. John Hick, 201

of the person responsible for the gifts and a wish to thank him. Thus there is a prior moral obligation on the part of man to seek God, even though he is not sure of God's existence.

Once this obligation is recognised and acted upon, the evidence that is available in organic nature, and the world as a whole, is given its proper context and acquires greater force than if the argument is regarded simply as an intellectual exercise. Anyway such a position of detachment is not really open to man as a moral being, and is a mere abstraction. As we can only see certain physical objects properly if we bring our concentration to bear upon them, so the significance of the evidence of design is only properly evaluated by the mind when there is an effort of the will preceding and accompanying it. Thus it is the moral state determines the intellectual. To neglect this throws the argument into a false setting, and deprives it of its true force.

(iv) The immediacy of design in nature is the means of general revelation. Darwinian evolution by natural selection excluded God from the picture of the natural world altogether. If he came into the reckoning at all it was only in the Deistic sense of the one who gave the initial impetus to the movement of evolution. "The Creator who breathed into a few forms or one the breath of life". Even those who advocated directed evolution as a theistic alternative nevertheless increased the sense of remoteness of the Deity from his creation from that which obtained before, for despite the fact that many who argued thus sought to express the idea that God was immanent in his creation and superintended each innovation and variation leading to the emergence of new forms of life, yet the psychological import of the term 'evolution' carried with it the notion of life developing from within the organism and free from external interference. Again, God was confined to the circumference of the universe and the sense of remoteness was not mitigated despite asseverations to the contrary. Similarly, while design was considered compatible with directed evolution, and the adoption of directed

evolution by some men of religious convictions was made in order to try to effect a reconciliation between evolution and design, yet the immediacy and force of design was undoubtedly weakened, and it ceased to play a serious apologetic role. The chief interest seemed merely in retaining a foothold for design within an evolutionary theory and affirming that there was a purpose in nature and human existence. But the design argument can only flourish upon the actual and immediate instances and examples of design which impress the mind, and appeal to, and reinforce, our intuitive awareness of it. The mere assertion of design or purpose in nature generally does nothing.

The immediacy of design in this sense and its apprehension by the intuition of the mind form the basis for our understanding of general revelation, because it is through this that man is made aware of an intelligence outside nature and which is responsible for the prospective order he sees within it. This agrees with the psychological experience of many who have studied nature on the inductive level and have confessed to the belief that they were tracing the thoughts of God after him, the conviction that they were in communication with an infinite mind which had established the order of the universe that they themselves were now discerning. Kepler and Einstein both confessed to this experience.

Here we have Mind discovering mind, Intelligence in communication with intelligence. Thus to the intuitive apprehension of the mind, which is itself organized upon teleological principles, the universe becomes the medium of a general revelation. It is the immediacy of actual instances of purpose and design in nature which have this revelatory effect, and not the mere conviction that God is in the process somewhere.

The Nature and Character of God shown by the Design Argument

The natural attributes of God. The argument falls short of orthodox doctrinal statements. While we may infer creative intelligence from the phenomena of the universe, we cannot affirm infinite wisdom. This is for the reason that both Kant and Hume advanced, that the cause must be proportioned to the effect; we cannot infer a totally omnipotent and omniscient God from the finite phenomena of the universe. R.G. Swinburne argues that this is not strictly correct and that

The universal adoption of this celebrated principle would lead to the abandonment of science. Any scientist who told us only that the cause of E had E producing characteristics would not add one iota to our knowledge. Explanation of matters of fact consists in postulating on reasonable grounds that the cause of an effect has certain characteristics other than those sufficient to produce the effect.¹

However, even when this is granted, it still does not entitle us to conclude that the Creator of the world is infinitely powerful and wise. Nevertheless, this 'falling short' of the argument from design does not seriously impair its value in affording some understanding of a creative power behind the universe. Indeed, if we rightly understand the limitations of natural theology in this respect we need not even regard it as a defect at all. It is only a lack, a deficiency, if to begin with we expect it to furnish us with a complete and orthodox picture of God's nature. Revelation itself when speaking of the omniscience, omnipotence and eternity of God is an accommodation to our limited apprehension of the meaning of these terms, and represents God to us not as he is in himself but as he stands in relation to us.

If it is conceded that design in nature points to a designer of nature, an architect or creator of the universe, then the power which could create such a world as this must be greater than any which we can experience in ourselves; than any which we observe in other visible agents and a power to which we cannot, from our observation or knowledge, assign any limits of space or duration.

¹ R.G. Swinburne, 'The Argument from Design' in Philosophy, July, 1968.

Thus, for all practical purposes it would not seem inappropriate to refer to this power as 'infinite'. The degree of power and knowledge necessary to bring the universe into existence cannot from our point of view be distinguished from infinite. The complaint that the design argument does not prove monotheism is therefore only of academic interest.

But what of the moral attributes of God? Hume argued that we cannot infer from the mixed phenomena of the world - its pain and pleasure, its suffering and joy, its good and evil - an unmixed principle of benevolence, an infinitely good God as responsible for its creation. By the same argument is also excluded the conclusion that the Being responsible for the world is wholly malevolent.

That leaves us with two other possibilities. That the Being that created the world is both good and bad, or neither. Hume considered that the regularity of the laws of nature, and the ordered character of the world generally, seem to be opposed to the first alternative. There remains only moral indifference. He recognised, however, that the existence of evil in the world is not incompatible with a perfectly good creator, but his perfect goodness would have to be proved by other means than the argument from design, which must start from the facts of the world as they are.

Paley, on the other hand, argued that if the Creator were indifferent to our happiness then we must impute to our good fortune (as design is excluded upon this assumption) both the capacity of our senses to receive pleasure and the supply of external objects fitted to produce it. But since either and, still more, both of these are too much to attribute to accident, nothing remains but to assume that he who created mankind wished their happiness and made provision for them with that end in view.

A limited doctrine of the benevolence of the Creator may be deduced from the data as it exists. Misery and suffering there are in the world, but generally Paley considered they have a secondary and accidental role. Teeth were made for eating not for aching. Often too much is made of the suffering of the animal kingdom, which arises from ascribing to the animals the fears and apprehensions that we ourselves experience, but which they do not possess. Darwin was influenced in his thinking, and particularly in his thinking about design and purpose in nature, by his reflections upon the sufferings of animals. Cruelty and suffering of any kind deeply affected him, but he could also be as optimistic as Paley when he chose to be. When, for example, he was seeking to commend the acceptance of his doctrine of natural selection, or the 'survival of the fittest', to his more sensitive readers, he argued,

When we reflect on this struggle we may console ourselves with the full belief that this war of nature is not incessant, that no fear is felt, that death is generally prompt and that the vigorous, the healthy and the happy survive and multiply. ¹

The spectre which haunted the Victorian imagination - 'nature red in tooth and claw', 'the great charnel house of nature' - was unnecessary and unjustified.

We are dealing with a mixed state of things, but the mixture is not such as to suggest the indifference of the Creator to the happiness or suffering, the misery or joy, of his creation. There would appear to be a preponderance on the side of what is pleasurable in the sentient creation - a conjunction of pleasurable objects and the capacity to enjoy them, which is too great to attribute to accident or good fortune; a preponderance which should lead us toward the conclusion that the Creator wished the happiness of his creation.

A very large proportion of the suffering and misery inflicted upon mankind is brought about by man's sin and wickedness. If that were removed, who can doubt that a great burden would be lifted, and its removal would contribute immeasurably to the sum of human happiness. This would not affect the suffering caused by natural disasters, but the argument serves to strengthen our belief

¹ Chas. Darwin, The Origin of Species (Sixth edition), 57

that happiness was meant to predominate over suffering. Even such natural calamities as famine and disease are sometimes caused or aggravated by the incompetence, foolishness or wickedness of men.

But in so arguing for a belief in the benevolence of a Creator we do not wish to be taken to imply that the pursuit of happiness is the chief end of existence, especially human existence. Man's experience exposes the fallaciousness of that view; his nature, as Kant pointed out, is not so constituted as to rest or be satisfied in any possession or enjoyment whatever. It was a weakness sometimes of the Deistic form of the argument from design, that it emphasised too much the order of nature and its supposed perfection. The corollary of that was that there must be universal happiness in the sentient creation. But evil and disorder are very real. The evidence for design does not ignore evil; it is presented in spite of evil. While, therefore, from the evidence before us it may be claimed that there are indications of the benevolence of a Creator towards his creatures, it would be a mistake to maintain that happiness is the chief end of animal or human existence.

We have seen how Kant argued that we must seek a higher end than this, which he found in man's moral nature. It has been argued in this thesis that there is a rapport between the world and man's moral and spiritual nature. Man belongs to nature and is an essential part of it so that the world cannot be explained or described without taking him and his moral nature into account. This reflects back upon nature and humanizes it; it makes nature the threshold of spirit. The naturalists have judged the tree by its roots, but it could be the other way about. The world can be seen as coming to its fulfilment in man, and in his moral and spiritual nature which is related to, but nevertheless transcends, the natural world.

Thus we may consider morality and righteousness, which include preeminently a right relationship with the Creator, as the supreme end of man's existence, not happiness. We are sent into the world, as Charles Kingsley once put it, not to be happy but to be right.¹ That is not a wholly correct statement of the matter, but at least it puts in right order the priorities and serves to correct the imbalance and proccupation with happiness that is found in some statements of the argument from design. Man's moral and spiritual nature point to a higher purpose for human existence in which happiness plays an important, though subsidiary, role.

This understanding of the goal of human existence would also appear to be in keeping with the character and role of the argument from design itself. As Bacon and others have pointed out the mind has a capacity for drawing things together along particular paths of thought and reflection. We are not without control in these matters and can choose the path in which our thoughts habitually run.

It has been the purpose of this thesis to show that the difficulties and objections to the design argument can be overcome so that, in principle, there is nothing to prevent us cultivating that direction of thought and reflection upon the relation of the universe to its Creator which will facilitate a new (and yet at the same time old) orientation upon human life and the world. This will not be without a morally beneficial effect for, since the thoughts of men are the springs of their actions, this view of life and the world as designed and purposive, and ultimately attributable to a wise, powerful, good and righteous Creator, must do something to elevate mankind, whereas the opposite view only serves to engender a sense of hopelessness and despair.

¹ Charles Kingsley, Scientific Lectures and Essays, (1885), 173

APPENDIX 1

THE LOGICAL STATUS OF THE ARGUMENT FOR EVOLUTION BEFORE AND AFTER THE

PUBLICATION OF DARWIN'S 'ORIGIN OF SPECIES'

A.O. Lovejoy reviews six arguments for the evolutionary hypothesis in the period 1830-1858 in order to establish the thesis that, the logical status of the argument was the same after as before the publication of The Origin.

(i) The argument from the sequence of types in palaeontology

There was evidence of progression of forms before 1859. Sedgwick and others took account of this and explained it as the "gradual evolution of creative power manifested by a gradual ascent towards a higher type of being ..." Sedgwick, of course, added that "the elevation of the fauna of successive periods was not made by transmutation, but by creative additions".¹

This progression of forms was suggestive of evolution and after 1859 was employed as an impressive corroboration of the doctrine of descent by Huxley and others. Yet Chambers had pointed this out in 1844. But the argument was not a 'proof'. It was too sketchy and general. The principal objections urged against it during the period 1845-59 were:-

- (a) The general and undeniable fact of 'missing-links' in the chain of past organisms.
- (b) The fact of the apparently sudden appearance of groups of allied and by no means absolutely primordial species in the lowest fossiliferous strata then known.
- (c) The sudden disappearance of whole groups of species at the end of certain geological periods and then the sudden replacement in the next period by species different in type from the former and closely allied to one another.

¹ A.O. Lovejoy, 'The Argument for Organic Evolution before The Origin of Species 1830-1858', in Forerunners of Darwin, (ed. B. Glass; 1959), 380

- (d) Within the limits of single great geological formations, the arrangement of fossils in the strata did not exhibit the required order of progression from the lower to the higher types, but sometimes even reversed that order. This was Sedgwick's principal point in the Edinburgh Review article on the Vestiges, as it was that of Hugh Miller in his Footprints of the Creator, (1849) the most-widely circulated of all the replies to the Vestiges.
- (e) "Superposition", as Miller put it, "does not mean parental relation". Descent may be assumed, but cannot be proved from the relative position of organic remains in the earth's crust.

All these objections were still valid in 1859 and until a number of years thereafter. Darwin's answer to all these was, that the fossil record was incomplete and, therefore, they did not contribute a disproof of descent.¹

(ii) Argument from Persistent Types

This was directed against the belief in the fixity of species and special creation, since the persistence of types was considered to be a witness to the fact that there had been no such complete and simultaneous extinctions of fauna and radical alterations in the terrestrial conditions as the Cuvierian theory supposed.

Chambers in 1845 cites specific examples of persistency in his Explanations. But such an argument did nothing to help transformationism. It only served to discomfit extreme special creationists. "Palaeontology, then, down to and beyond 1859, could offer no cogent proof of the transformation of species; and though it also could offer no cogent disproof, it did seem to exhibit some facts which, as we have seen Darwin himself admitting, could be truly urged as a valid argument against his theory." (394)

¹ A.O. Lovejoy, 'The Argument for Organic Evolution before The Origin of Species 1830-1858', in Forerunners of Darwin, (ed. B. Glass; 1959), 385-8

(iii) Argument concerning the sterility of hybrids: rejection of Buffon's definition of species.

Buffon defined species as, "those kinds of organisms which cannot by mating with one another produce fertile offspring. Those which can do so were called 'races' or varieties". From this definition he deduced (illicitly) two factual propositions, (a) "that organisms not of the same 'species' in the sense defined, can have no ancestors in common, and, (b) that the so-called 'specific' characters of a species are immutable, e.g. that all the descendants of the gill-breathing marine animals are still marine animals, that no extant quadrupeds having solid hoofs can be among the posterity of any animals having toes or cloven hoofs." This, says Lovejoy, bedevilled 18th Century biology, and continued right into the 1860's. "Thus Huxley, in his lectures of 1862, warned his audience of the one missing-link in the chain of evidence - the fact that selective breeding has not yet produced species that are sterile to one another." ¹

Huxley disposed of the difficulty by an act of faith - it will be proved later. Darwin devoted a whole chapter to casting doubt upon the assumption or fact of sterility between species. (a) Not all hybrids have been shown experimentally to be sterile. (b) Some hybrids are not sterile. He refers to various experiments, notably with plants, "Considering all the ascertained facts on the inter-crossing of plants and animals, it may be concluded that some degree of sterility both in first crosses and hybrids, is an extremely general result, but it cannot, under our present state of knowledge, be considered absolutely universal." (Origin) ²

The point that Lovejoy makes is that Darwin was drawing upon knowledge that was and had been available during the last two decades and more.

¹ A.O. Lovejoy, 'The Argument for Organic Evolution before The Origin of Species 1830-1858', in Forerunners of Darwin, (ed. B. Glass; 1959), 395

² Ibid., 398

(iv) Argument from rudimentary and abortive organs.

Special creationists had been obliged to devise 'explanations' of these; "symmetry", "in order to complete the scheme of nature," etc. But Darwin looked upon them as evidence of heredity; they had no function; they could not have any survival value. Thus they formed part of an argument for evolution and a decisive argument against all would-be explanations of the characteristics of organisms as resulting from 'first-causes', or purposive 'pre-arrangements' of the Creator. ¹

Chambers had noted and commented upon this fact also in the 1840's as evidence of descent, but "since he liked to give an edifying turn to his presentation of scientific facts, rudimentary organs seem to have been a little troublesome for him. ²

(v) Argument from the homologies in the internal structures of organisms of different species or orders: the 'unity of type'.

The wing, the hand, the paddle, all have the same structure "... species (or orders) which seem to the superficial observer too unlike one another to be descended from common ancestors prove, when their inward parts are investigated, to show such similarity that community of descent seems the obvious explanation". ³ Darwin made great use of this argument in The Origin. But Chambers had anticipated him in the 1840's. He, too, observed the 'unity of plan' and speculated upon its significance for organic evolution, though he was not propounding a universal theory of the nature or modus operandi of its causes. He conceived the plan to be present in the first germ of life, as it were, and unfolding in successive generations.

1 A.O. Lovejoy, 'The Argument for Organic Evolution before The Origin of Species 1830-1858, in Forerunners of Darwin, (ed. B. Glass; 1959), 400

2 Ibid., 401

3 Ibid., 403

(vi) Argument from comparative embryology; the theory of recapitulation.

Darwin considered the argument from embryology to be the strongest 'second to none', in support of his evolutionary theory. "Community of structure reveals community of descent ... as the embryo often shows, more or less plainly, the structure of the less modified and ancient progenitor of the group, we can see why ancient and extinct forms so often resemble in their adult state embryos of existing species of the same class." (Origin)

Chambers had anticipated this too, but had been reproached for "baseless speculation". In the third edition of the Vestiges he wrote, "... embryotic development is now a science. Its primary positions are ... that the embryos of all animals pass through a series of phases of development each of which is the type or analogue of the permanent configuration of tribes inferior to it in the scale ..." In 1855 Baden Powell included the same phenomena of embryonic recapitulation in his review of 'the evidence derived from physiology' for the probability of the idea of the transmutation of species'.¹

All these arguments are only 'circumstantial evidence'. The special creation hypothesis was still 'conceivable', in Huxley's words, and the state of the argument was basically the same after 1859 as before. There was very little that was new in Darwin's book. Lovejoy concludes with a quotation from A.W. Burn's Modern England (1878). "Hardly any advance has since been made on Chambers' general arguments, which at the time they appeared would have been accepted as convincing, but for theological truculence and scientific timidity. And Chambers himself only gave unity to thoughts already in wide circulation ... Chambers was not a scientific expert, nor altogether an original thinker, but he had studied scientific literature to better purpose than any professor ... The considerations that now recommend evolution to popular audiences are no other than those urged in the Vestiges ..." ²

1 Ibid., 409

2 Ibid., 414

APPENDIX II

DARWIN AND THE A PRIORI CONCEPTS OF PLENITUDE AND CONTINUITY.

In view of the importance Darwin attached to the principle that nature does not proceed by leaps, and his belief that the law of natural selection exemplified this principle, (showing how every change in species was brought about by the accumulation of innumerable small steps, which, he argued, must have taken place, even if it cannot now be demonstrated that they, in fact, took place), it is worth relating this concept, which was basic to Darwin's thinking, to the ideas of plenitude and continuity, which A.O. Lovejoy discusses in his book, The Great Chain of Being. The universality and persistence of those ideas in European thought from Plato onwards, right up to the time of Darwin, would appear to have some bearing upon the development of Darwin's ideas and the central place which the principle of continuity occupies in his theory.

Lovejoy argues that, not only does Platonic thought lead to the awareness of Ideas that are the essence of the phenomena of the material world, but that, in fact, a reverse process is also initiated, which requires the realization of Ideal forms in the empirical world. This leads to the principle of plenitude, i.e. that all and every Idea should find concrete expression in nature - the more the better. The principle of plenitude requires that every gap should be filled, i.e. everything that is possible should exist in actuality.¹

While Aristotle did not subscribe to the principle of plenitude, since his God generates nothing, we find emerging in his thought another conception which was destined to fuse with the Platonic doctrine, viz. that of continuity, that is, that everything in the organic world shows signs of shading off into a series.²

From the Platonic principle of plenitude the principle of continuity could be directly deduced. If there is between two given natural species a theoretically possible intermediate type, that type must be realized - and so on, ad infinitum; otherwise, there would be gaps in the universe, the creation would not be as 'full' as it might be, and this would imply the inadmissible consequence that its source, or author, was not 'good', in the sense which that adjective has in the Timaeus.³

1 A.O. Lovejoy, The Great Chain of Being, 54

2 Ibid., 56

3 Ibid., 58

In the Middle Ages we find the principles of plenitude and continuity equally prominent in man's contemplation of organic nature.

Albert Magnus writing De Animalibus had already laid it down that 'nature does not make animal kinds separate without making something intermediate between them; for nature does not pass from extreme to extreme nisi per medium'. Thomas Aquinas accordingly dwells upon the 'wonderful linkage of beings (connexio rerum)' which nature 'reveals to our view. The lowest member of the highest forms is always found to border upon (contigere) the highest member of the lower genus.'

The principles referred to were used not merely to argue that a continuous series of organisms existed in the natural world, shading off one into another, but also that an infinite number of spiritual beings existed between God and man. Thus, a priori their existence could be proved apart from revelation. Lovejoy further argues, that it was not primarily the discoveries of Copernicus and Kepler that led to the view of an infinitely populous universe, but the principle of plenitude entertained in Medieval thought which found expression at that time in the seventeenth century.

Leibniz continued the exemplification of the principle with his horror vacui which he was sure nature shared. "In its internal structure the universe is a plenum and the law of continuity, the assumption that 'nature makes no leaps', can with absolute confidence be applied to all the sciences, from geometry to biology and psychology. 'If we denied it, the world would contain hiatuses, which would overthrow the great principle of sufficient reason and compel us to have recourse to miracles and pure chance in the explanation of phenomena.'" ¹

The universality and ubiquity of these principles in European thought have significance for Darwin's view of nature, and suggest that his doctrine of an 'infinite series of small steps', by which organisms are connected, and by means of which they are transformed from one species into another, is not without a priori origins.

¹ A.O. Lovejoy, The Great Chain of Being, 181

We find a close approximation to this view without, of course, the concept of generation, or descent, in the eighteenth century in the writing of Soames Jenyns.

though the chain [of being] itself is sufficiently visible, the links, which compose it, are so minute, and so finely wrought, that they are quite imperceptible to our eyes. The various qualities with which these various beings are endowed, we perceive without difficulty, but the boundaries of those qualities which form this chain of subordination, are so mixed, that where one ends, and the next begins, we are unable to discover ...

Animal life rises from this low beginning in the shell-fish, to the confines of reason, where, in the dog, the monkey, and chimpanzè, it unites so closely with the lowest degree of that quality in man, that they cannot easily be distinguished from each other ... 1

The conviction generated in many minds in the eighteenth century by the principles of plenitude and continuity, was that the 'missing links' in the chain of being actually existed in the present time somewhere, but had yet to be found. Man's knowledge of the world was limited, many parts had not yet been explored. It was confidently expected that the gaps would progressively be filled up as man's knowledge advances.

It was in the eyes of the eighteenth century, a great moment in the history of science when Trembley, in 1739, rediscovered fresh-water polyp Hydra ... this creature being at once hailed as the long sought missing link between plants and animals - for which Aristotle's vague zoophytes were no longer considered quite sufficient. This and similar discoveries in turn served to strengthen the faith in plenitude and continuity as a priori rational laws of nature. 2

The view that the gaps that existed in the chain might, in fact, be real was not one that was on the whole seriously entertained. "Nature", Bonnet remarked "seems to make a great leap in passing from the vegetable to the fossil (i.e. the rock); there are no bonds, no links known to us, which unite the vegetable and the mineral kingdoms. But shall we judge of the chain of beings by our present knowledge? Because we discover some interruptions, some gaps in it here and there, shall we conclude that these gaps are real? ... The gap that we find between the vegetable and the mineral will apparently some day be filled up.

1 A.O. Lovejoy, The Great Chain of Being, 197

2 Ibid., 233

There was a similar gap between the animal and vegetable; the polyp has come to fill it and to demonstrate the admirable gradation there is between all beings." ¹ Thus the eighteenth century scientist proceeded upon the assumption that somewhere in the world there existed the organic and non-organic beings that would supply all the infinitely small links in the chain of being that were now missing.

From this to Darwin's view of the world is but itself a small step, except that for him the organic links were not to be found somewhere in the contemporary world, nor were they necessarily intermediate between existing species. They were to be presumed to have existed in the past, and may have been the common progenitor of what are now diverse species. Except for this difference, however, the rest remained the same: where gaps existed they were not to be regarded as real. The rational law of the natural world was still natura non saltum facit, and as Darwin put it, "... Differences blend into each other by an insensible series; and a series impresses the mind with the idea of an actual passage." ²

The search for missing links in the chain of being before Darwin had not always been confined to this world. When the acute difficulty of the subject was felt Leibnitz at times resorted to the idea that they might be found on other planets, and "Maupertius, who ranked as a great man of science in his time, proposed another equally far-fetched conjecture to save the doctrine of the completeness and continuity of forms. Many species once existing must, he suggested, have been eliminated by some accident, such as the approach of a comet. Nature as we now see it is like a once regular edifice after it has been struck by lightning: 'it presents to our eyes only ruins in which we can no longer discern the symmetry of the parts nor the design of the architect.'" ³

1 A.O. Lovejoy, The Great Chain of Being, 232 & 233

2 Chas. Darwin, The Origin of Species, (sixth edition), 38

3 A.O. Lovejoy, The Great Chain of Being, 255

Darwin, in order to rescue his own doctrine of the continuity of forms from the incompleteness of the geological record, employed an illustration strikingly similar.

For my part ... I look at the geological record as a history of the world imperfectly kept and written in a changing dialect; of this history we possess the last volume alone, relating only to two or three countries. Of this volume only here and there a short chapter has been preserved and of each page only here and there a few lines ... 1

The apparent affinity between Darwin's view of the continuity of organic forms in nature and the development of this idea in philosophical thought and its application, prior to Darwin, to nature, suggests the possible a priori origin and role of the concept in the formulation of Darwin's evolutionary theory.

1 Chas. Darwin, The Origin of Species, 271

APPENDIX III

CHANCE, INDETERMINACY AND DESIGN

Jacques Monod argues, in his book Chance and Necessity, that man is an accident, the product of the chance processes which bring about mutations in the genetic material of an organism, and the necessity of the consequences of the well-ordered, replicative, interlocking mechanisms which constitute that organism's continuity as a living form. The DNA code reveals the necessity in the replicative process, which is unvarying, except where changes are introduced by chance, due to the basic uncertainty principle underlying all nature. When a chance variation is introduced the system faithfully reproduces it. This is the scientific basis of evolution and natural selection. Selection is brought about not simply by the pressures from outside the organism, but also from the pressures of the organism's teleonomy. Only those variations which fit the teleonomy of the organism, and which take it in the direction in which it is going for superiority and survival, are accepted. Thus Monod concludes:

We say that these events are accidental, due to chance. And since they contribute the only possible source of modification on the genetic text, itself the sole repository of the organisms hereditary structures, it necessarily follows that chance alone is at the source of every innovation, of all creation in the biosphere. Pure chance, absolutely free, but blind at the very root of the stupendous edifice of evolution: this central concept of modern biology is no longer one among other possible, or even conceivable hypotheses. It is today the sole conceivable hypothesis, the only one compatible with observed and tested fact. And nothing warrants the supposition (or hope) that conceptions about this should, or ever could, be revised. 1

In answer to this thesis, which would appear to exclude the concept of design altogether from organic nature, it might be argued that,

First, Monod's position presupposes an ordered system into which chance variations are introduced. That the ordered system itself is the product of chance is an assumption that underlies the argument, but is not proved. The simplest cells which are known to us, and which are available for investigation have, as Monod himself has put it, "nothing simple about them". They "utilize about fifty

1 J. Monod, Chance and Necessity, 110

different proteins as well as DNA and RNA of various kinds. Such a structure is far too complicated to have come into existence all at once by chance." ¹ Furthermore the reciprocity between the living cell's proteins which act as catalysts, and the nucleic acid which acts as a stable self-copying information carrier creates an extra difficulty to the chance emergence of the cell, for both seem equally indispensable. "Which, then, came first: nucleic acid or proteins? This is the riddle of the chicken and the egg reduced to a scientifically intelligible question, but hardly easier to answer". ²

So then, as far as our present knowledge and experience go, the simplest cell, the basic unit of life, displays a complexity and character which, it is generally agreed, could not all at once have come into existence by chance.

If because of this it is assumed that the living cell we know must have been preceded by simpler arrangements of molecules which led up to it by a gradual series, we ought at least to acknowledge that at this point we are embarking upon speculation. ³ Any imaginary examples of such arrangements which might be supposed to have constituted the evolutionary series should be understood as hypotheses introduced to support a hypothesis.

We return then to the fact that at the foundation of organic life we encounter order which is not self-explanatory. ⁴ To regard such order as the product of chance rather than design and intelligence is a choice which can be made, but the nature of the grounds on which it rests should be fully recognised.

1 Oliver Gillie, The Living Cell, 19

2 Ibid., 20

3 "The macromolecule to cell transition is a jump of fantastic dimensions which lies beyond the range of testable hypothesis. In this area all is conjecture". D.E. Greene and R.E. Goldberger, Molecular Insights into Living Process, (1967), 407.

4 Monod himself seems implicitly to recognise that the ordered system is dominant, and has logical priority over accident, or chance, in the organism. Thus he states, "... modern biology recognises ... that all the properties of living beings are based on a fundamental mechanism of molecular invariance. For modern theory evolution is not a property of living beings, since it stems from the very imperfections of the conserving mechanism, which, indeed, constitutes their unique privilege ..." (p.113). On this understanding the 'noise' in the system is incidental to the system itself.

Secondly, with regard to Monod's argument that, at the molecular level, chance operates in the changes that are produced in the genes which are then transmitted in the ordered, replicative system of the DNA code, these questions, (together with those relating to the extent to which such changes influence the life and development of the organisms), are clearly matters to be determined by the scientist. But assuming then that an already ordered system is modified in this way, apparently by chance variations introduced into the system, what significance does this have for the design argument ?

A.R. Peacocke argues that it "does not really add anything new in principle to the debates of the last hundred years". "The essential crux in these debates", he continues, "was, and is, that the mechanism of variation was causally entirely independent of the processes of selection, so that mutations were regarded as purely random with respect to the selective needs of the organism long before the molecular mechanisms of transmission, and alteration, of genetic information were unravelled in the last two decades".¹

However, if there is indeterminacy at the molecular level does it affect my understanding of design in nature ? Here our understanding of scale is of great importance. Regularities of matter on a larger scale, which have been raised to the level of being describable as 'laws', arise from the combined effect of apparently random microscopic events which constitute the macroscopic. Nevertheless, we consider ourselves perfectly entitled to speak of these regularities as laws despite the indeterminacy of their origins on the smaller scale. Or to take another example, my knowledge of the fact that, scientifically speaking, my desk is a mass of whirling atoms does not invalidate my experience, at another level, and on a different scale, of its solidity, continuity and identity. By the same token, my awareness of indeterminacy in the microcosm does not invalidate my experience and recognition of design in the macrocosm, nor the inference that the cause of such design is a creative intelligence.

¹ A.R. Peacocke, Creation and the World of Science, Bampton Lectures, (1978), 93

To take an illustration. An artist may make a number of random strokes in the painting of a picture, a close examination of the brush marks will reveal this to be the case, but when I stand back from the canvass, the overall impression is one of design and purpose and meaning, and I have no difficulty in attributing the 'picture' to an artist, a designing intelligence. So with the composition of the natural world, it is the scale on which the impression is received that is important. If we were equipped with faculties capable only of receiving impressions on a microscopic level it is probable we should discern no purpose, or design, in nature at all. But this is not the case. Man is equipped so as to discern purposive arrangements, or design, in natural organisms, as he is equipped to discern continuity and identity in natural objects. In this way, as in other respects, man seems strangely dovetailed into the world in which he finds himself, and his knowledge of nature on the larger scale cannot be explained away by that which derives from the smaller scale without severe impoverishment and distortion of his understanding and appreciation of himself and his world.

Thus there seems to be no reason why randomness, or chance, at the molecular level should determine ultimately how we understand and interpret the universe.

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