The Principle of Plenitude and Natural Theology in Nineteenth-Century Britain

RICHARD R. YEO*

1

In his classic study, *The Great Chain of Being*, Arthur Lovejoy delineated a complex set of concepts and assumptions which referred to the perfection of God and the fullness of creation. In attempting to distil the basic or ‘unit idea’ which constituted this pattern of thought, he focused on the assumption that ‘the universe is a *plenum formarum* in which the range of conceivable diversity of *kinds* of living things is exhaustively exemplified’. He called this the ‘principle of plenitude’. Lovejoy argued that this idea implied two others—continuity and gradation—and that together these reflected a pre-occupation with the ‘necessity of imperfection in all its possible degrees’, a concern which had pervaded Western thought since Plato and gave rise to the powerful ontology known as the ‘great chain of being’.

Although Lovejoy’s approach to the history of ideas has been criticized, this need not imply that the concepts he discussed are no longer of interest to intellectual historians or historians of science. Rather, it suggests a need for historical sensitivity to the different formulations of those ideas in specific contexts. William Bynum canvassed this alternative in an essay dealing with the possible fate of the chain of being in the nineteenth century, a period which lay outside Lovejoy’s survey. Lovejoy’s pursuit of his theme and its manifold permutations ended in the late eighteenth century, with the thesis that the chain of being acquired a temporal dimension and was thus transformed into a chain of becoming. In making this point, Lovejoy revealed the inherent tensions in the


*School of Humanities, Griffith University, Brisbane, Australia.

I would like to thank the referee (Dr J. H. Brooke) and the editor for their helpful comments on an earlier draft.
conceptions of Divine perfection which stemmed from Plato, and saw the transition he described as a ‘logically inevitable outcome’.3 Bynum suggested that this philosophical conclusion could be enriched by closer historical analysis of the social, intellectual and national contexts which involved assumptions concerning the chain of being. His essay dealt mainly with anthropological debates concerning man’s place in nature, and showed the ways in which ‘the chain of being was discarded as a conceptual framework’ by thinkers interested in explaining social change.4 But this example can lead to the more general contention that Lovejoy’s philosophical account of the transformation of the chain of being at the close of the eighteenth century concealed the ways in which it was in fact dismantled rather than temporalized. Lovejoy claimed that ‘When the notion of the Scale or Chain of Being was translated from its static to its temporalized version, some of the related ideas inherent in the former passed over into the latter’.5 However, the continuing connection between the various unit ideas which is implied here was not apparent in nineteenth-century discourses.6 It may therefore be too simplistic to speak of the chain of being acquiring an historical or temporal dimension. Rather, it could be proposed that the system of ideas and assumptions known as the chain of being became fragmented and that its component ideas—continuity, gradation and plenitude—although still discernible in various debates, became divorced from each other and transformed by new intellectual pressures. This article investigates the ways in which the principle of plenitude functioned in the writings of natural theology from the work of Paley and the Bridgewater Treatises through to the mid-nineteenth-century debate on the plurality of worlds in which it was the constitutive idea, even though other unit ideas of the chain of being had been rejected. In doing so, it reveals certain qualifications of this principle and relates these to discussions of the question of species and to the concepts of final cause and design in natural theology.

II

Lovejoy defined the principle of plenitude as ‘the realization of conceptual possibility in actuality’,7 and traced this assumption to speculations which led to the notion that ‘the existence of all possible beings at all times is . . . an implicate of the divine nature’.8 He detected this thinking in philosophers from Plato and Abelard to Leibniz and Spinoza, and related it to deliberations about the ‘sufficient reason’ for the existence of finite things.9 This area of thought was a site of enormous tension because it involved the

5 Lovejoy, op. cit. (2), Essays, p. 169.
7 Lovejoy, op. cit. (1), p. 52.
8 Ibid., p.154.
9 Ibid., pp. 70–72.
question of whether, as Spinoza contended, the Deity, in his perfection, was constrained to produce all logically conceivable forms of existence so that this world which does exist, must do so by absolute, rational necessity. This conclusion conflicted with the voluntarist tradition in Christian philosophy which represented the creation as an act of God's free will, and with the ideological arguments which implied a Divine choice of the best possible world. Lovejoy suggested that Leibniz attempted to avoid the universal necessity of Spinoza by proposing that 'there are species which are possible but nevertheless do not exist' because, in the concrete world, as opposed to the world of essences, only certain combinations are possible. There were 'species which never have existed and never will exist, since they are not compatible with the series of creatures which God has chosen'. However, Lovejoy indicated that Leibniz continued to insist that the world which actually exists was the best possible and that, within it, no gaps of any sort could be admitted.

Thus, by the eighteenth century, in spite of these tensions, there was a conception of plenitude which stemmed from the conviction that the omnipotence and goodness of God gave rise to a world containing all possible forms of life. This notion, according to Lovejoy, supported the emphasis on diversity and fullness apparent in eighteenth-century thought and sponsored, for example, the belief in intermediate forms and missing links. 'Given the principle of plenitude, which most well-instructed persons then accepted in theory, it followed that the existence of aquatic anthropoids was more probable than their non-existence'. By the end of the century, when the chain of being was projected as an historical series, this principle was interpreted to include the future realization of further possible kinds of life.

Lovejoy also offered another definition of the principle of plenitude: namely, the idea that all space, or at least all matter, should contain life. The influence of this assumption was most obvious in debates about the plurality of intelligent worlds on other planets, which became more prominent with the emergence of heliocentric cosmology in the seventeenth century. Lovejoy saw these debates as 'manifest corollaries of the principle of plenitude, when that principle was applied, not to the biological question of the number of kinds of living beings, but to the astronomical questions of the magnitude of the stellar universe and of the extent of the diffusion of life and sentiency in space'. But throughout his analysis of the writings on the plurality of worlds, Lovejoy gave two slightly different accounts of the way in which this corollary was derived from the principle of plenitude. Thus, in the case of Giordano Bruno, the belief in the existence of other worlds stemmed from the necessity for the realization of the full scale of being: that is, other worlds provided the accommodation for the possible forms of life which did not exist on earth. More often, however, Lovejoy emphasized the argument which moved from the supposition of God's infinite creative power to the conclusion that wherever

10 Ibid., pp. 156–158.
11 Ibid., pp. 170–171.
12 Ibid., p. 272.
13 Ibid, III. For a study which also stresses the scientific thinking involved, see S.J. Dick, Plurality of Worlds: the Origins of the Extraterrestrial Life Debate from Democritus to Kant. Cambridge, 1982.
there was matter there should be life, that having created matter in any part of the universe, the Deity would not waste the opportunity to populate it with living beings.

Thus, while the salient feature of the principle of plenitude, as Lovejoy presents it, is the emphasis on the fullness of creation and the variety of life within it, it is possible to detect two different formulations of its premises. The first, and for Lovejoy's purposes, the most important of these is the notion that postulates the actual existence of all conceivable (or possible) forms of life. I call this 'conceptual' plenitude. The second assumption, which seems to have coexisted with the first in the period studied by Lovejoy, is the notion that matter exists to sustain life and that, hence, wherever there is matter there should be life. I call this 'spatial' plenitude.

It is worth remarking that these two assumptions do not logically entail each other. The belief that all conceivable (or practically possible) forms of life exist, or have existed, does not necessarily imply that all space or matter must support life. Similarly, the contention that all matter sustains life does not require a commitment to the belief in the actual existence of all conceivable forms of life. From Lovejoy's work it appears that these two assumptions coexisted without tension until the late eighteenth century, but a study of nineteenth century debates discloses a rejection of the first (conceptual plenitude) and a continuing adherence to the second (spatial plenitude). Thus, by the 1830s, the idea of a complete and continuous chain of being, embracing all conceivable forms and gradations of life, was largely rejected in both scientific and theological discourse. However, writings on natural theology continued to celebrate the variety and fullness of creation and, in the 1850s, a lively dispute over the plurality of worlds indicated the presence of assumptions about the nexus between matter and life.

This article draws attention to the ways in which different inflections of the principle of plenitude and its associated assumptions could be used to support different scientific and theological positions. It argues that writers of natural theology perceived a need to dissociate themselves from formulations which could be deployed by proponents of the transmutation of species. Secondly, it shows how the principle of spatial plenitude was implicated in arguments about the place of teleological and morphological concepts of design in natural theology, an issue highlighted by the debate on the plurality of worlds.

III

In works of natural theology since the early eighteenth century, the extent and diversity of creation were cited as illustrations of God's power and benevolence. By the nineteenth century, this was a common theme across texts written from different denominational positions. Thus, in his Bridgewater Treatise, William Buckland announced that 'the design of the Creator seems at all times to have been, to fill the waters of the sea, and cover the surface of the earth with the greatest possible amount of organized beings enjoying life.'

survey this profusion of living beings without 'a feeling of profound astonishment at the inconceivable variety of forms and constructions to which animation has been imparted by creative power.' Similar sentiments could be found in more controversial writers such as Charles Bray and Robert Chambers, both of whom agreed that the Deity had clearly set out 'to diffuse existence as widely as possible, to fill up every vacant piece of space with some sentient being to be a vehicle of enjoyment'. But the enthusiasm of these writers was eclipsed by Thomas Dick, the Scottish evangelical and popular author. Dick provided detailed numerical calculations to evince the 'plan of boundless and universal variety' upon which the universe was constructed, and went so far as to speculate about the even more beautiful character of the earth before the Fall, when 'no barren deserts of heath and sand disfigured the rich landscape of the world'.

This reference to the plenitude of life throughout the globe was prominent in William Paley’s *Natural Theology* of 1802, a text often cited as the classic expression of the design argument. In one section of his argument—the discussion of the Deity’s benevolence—Paley celebrated the extent and diversity of sensual pleasure enjoyed by animal life in a world in which 'the air, the earth, the water, teem with delighted existence'. Having accepted this principle of plenitude as a primary feature of creation, he had recourse to it as a rationalization of phenomena which apparently threatened the concept of benevolent design. In his *Essay on the Principle of Population* of 1798, Thomas Malthus referred to the enormous rate of reproduction in 'the animal and vegetable kingdoms' as part of his argument about the imbalance between population growth and food resources. However, Paley saw this 'superfecundity' of nature as the means chosen by God 'to keep the world always full', and he regarded the necessary destruction which accompanied it as subservient to this larger good. In his view, those who criticized this 'superabundant multiplication' overlooked the ways in which it worked to fill all parts of the world with living things.

Where this vast fecundity meets with a vacancy fitted to receive the species, there it operates with its whole effect; there it pours in its numbers, and replenishes the waste. We complain of what we call the exorbitant multiplication of some troublesome insects, not reflecting that large portions of nature might be left void without it. If the accounts of travellers may be depended

17 P.M. Roget, *Animal and Vegetable Physiology Considered with Reference to National Theology*, 2 vols. London, 1834, i, p. 11, 13. For a reflection on the contrast between the feminine image of 'Nature' in Roget and the masculine 'Divine Artificer' in Paley, see S. Giserman, 'Early Victorian science writers and Tennyson’s “In Memoriam”': a study in cultural exchange, *Victorian Studies*, (1975), 19, pp. 277–308(290–291). While this contrast is useful, it is important to recognize that Paley also emphasized the fecundity of nature in ways which went beyond the design argument.


19 T. Dick, *On the Improvement of Society*. London, 1833, p. 257; for his calculations leading to the conclusion that there were more than sixty thousand billion ‘distinct ideas, conceptions or contrivances, in relation to the animal world’, see ibid., pp. 260–262.


upon, immense tracts of forest in North America would be nearly lost to sensitive existence if it were not for gnats . . . Again, hosts of mice are reckoned amongst the plagues of the north-east part of Europe; whereas vast plains in Siberia . . . would be lifeless without them.24

Early nineteenth-century writings on natural theology emphasized the diversity as well as the spatial extension of the living world. Indeed, the references to this manifestation of plenitude—the feature most emphasized by Lovejoy—may have been strengthened by the increasing use of evidence from the organic sciences. Although including a chapter on astronomy, Paley stated his preference for examples drawn from the more complex formations of the animal world and the evidence of purposive adaptation which they offered.25 Roget, whose Bridgewater Treatise dealt with animal and vegetable physiology, also began with this contrast between the mathematical order of physical science and the phenomena of the organic kingdom:

Far different is the aspect of living Nature. The spectacle here offered to our view is everywhere characterized by boundless variety, by inscrutable complexity, by perpetual mutation.26

In the works of Paley and the Bridgewater authors, this feature of nature, which Roget called the 'law of variety',27 reinforced the teleological argument: it allowed an appeal to countless examples of form adapted to function and environment by means of minute modification. Roget observed that 'even when the purpose to be answered is identical, the means that are employed are infinitely diversified in different instances, as if a design had existed of displaying to the astonished eyes of mortals the unbounded resources of creative power'.28 From this perspective, the plenitude of natural forms became an example of the purposiveness of variety in God's intricately designed creation.

At this point, it is necessary to be more specific about these allusions to the principle of plenitude. Although the previous statements about the fullness and diversity of creation have clear affinities with those cited by Lovejoy, it is important to recognize that they did not involve a commitment to the notion of sufficient reason which had been associated with the idea of plenitude in the eighteenth century. In nineteenth-century natural theology, the emphasis on the extensive distribution of animal life did not derive from a conviction about the necessary realization of logically possible forms, and it did not imply the complete continuity of the chain of being. Although Paley strongly emphasized the plenitude of nature, in the sense of all possible space on earth being filled with life, he had cause to reject the implication previously drawn from the principle of sufficient reason: that is, the assumption that all conceivable forms of life must actually exist. In canvassing various 'atheistic' objections to the thesis of design in nature, he came to the suggestion that there was no warrant for the inference of a purposeful Designer from the existence of organized forms of life: on this view, as Paley recorded it, these were simply the surviving relics of the many 'possible varieties and combinations of beings which have existed; every possible variety of being hath, at one time or another, found its

24 Ibid. p. 511.
26 Roget, op. cit. (17), i, p. 9.
27 Ibid., pp. 48, 10–13.
28 Ibid., p. 48.
way into existence . . ., and those which were badly formed, perished'. Paley countered this hypothesis of an original infinite number of living forms by denying the assumption of conceptual plenitude.

Multitudes of conformations, both of vegetables and animals, may be conceived capable of existence and succession, which yet do not exist. Perhaps almost as many forms of plants might have been found in the fields, as figures of plants can be delineated upon paper. A countless variety of animals might have existed which do not exist.

While earlier writers such as J. B. Robinet speculated about the likely existence of mermaids and other intermediate forms, Paley pointed to the absence of 'unicorns and mermaids, sylphs and centaurs' as evidence against the suggestion that the existing animals were merely the chance remains of an infinite series. In his view, there was no such energy operating 'as that which is here supposed, and which should be constantly pushing into existence new varieties of beings'. Furthermore, he argued that the classification of plants and animals into genera and species, a system 'founded in the order which prevails in external nature', stood in contradiction to the hypothesis of 'a variety which rejects all plan.' Thus, in seeking to safeguard the argument from design, Paley exposed the tension between the principle of plenitude and the notion of fixed species.

Paley did not name his atheistic opponents, and the objections he cited derived from a variety of sources extending from the Epicurians to the transformist or evolutionary theories of Buffon and Erasmus Darwin. He did not distinguish between general philosophical objections and those formulated in scientific treatises, rejecting them all in favour of the concept of design. By the 1830s, however, some authors of the Bridge-water Treatises had to confront doctrines of transmutation current in French biology and comparative anatomy, which had definite implications for their own scientific disciplines and their natural theology. William Whewell gave a succinct statement of the implications for teleological assumptions in 1837 when he explained that 'if we allow such a transmutation of species, we abandon the belief in the adaptation of the structure of

30 Ibid., p. 69. This aspect of Paley's text has received little, if any, attention; one commentator has claimed that his concerns were 'pastoral rather than philosophical', that he 'paid no attention to the principle of plenitude nor to the continuity of the great chain of being'. E. Manier, The Young Darwin and his Cultural Circle, Dordrecht, 1978, p. 72.
32 Ibid., p. 70.
34 These two levels were, of course, related in the works of contemporaries. Erasmus Darwin made use of David Hume’s exploitation of the phenomenon of generation as a possible model for creation. See F.C. Haber, in B. Glass, O. Temkin and W. Straus (eds): Forerunners of Darwin, Baltimore, 1959, p. 251. Darwin's Zoonomia, originally published between 1794 and 1796, reached a third edition in 1801, just before Paley's book appeared. It is likely that Paley had some of Darwin's arguments in mind—such as the determination of structure by use. See Paley, op. cit. (21), pp. 72–76. Although he did not mention Hume's Dialogues concerning Natural Religion, it does seem that he sought to counter some of the points in it—such as the problem of treating the world as logically equivalent to its constituent parts. See D.I. Le Mahieu, The Mind of William Paley: A Philosopher and his Age. Lincoln and London, 1976, pp. 67–68.
every creature to its destined mode of being'. Transmutationist theories were discussed in British scientific circles during the 1820s, and with the publication of the second volume of Charles Lyell’s *Principles of Geology* in 1832, the speculations of J. B. Lamarck were clearly presented to English readers. For, although Lyell criticized Lamarck, he provided an extensive account of his views, thus giving renewed significance to the species question just before the Bridgewater Treatises began to appear.

Lyell’s exposition of Lamarck revealed the ways in which the principle of plenitude and its associated concepts could be used to support the idea of transmutation. In referring to the chapter on species in the *Philosophie Zoologique*, Lyell gave the following paraphrase of Lamarck’s argument:

> The more we advance in the knowledge of the different organized bodies which cover the surface of the globe, the more our embarrassment increases, to determine what ought to be regarded as a species, and still more how to limit and distinguish genera. In proportion as our collections are enriched, we see almost every void filled up, and all our lines of separation effaced...\(^3\)

In this way, the idea of a plenitude of living forms could be seen to endanger the immutability of species. Secondly, Lyell showed that Lamarck’s conception of a tendency to progressive improvement—one of the basic assumptions of his philosophy of nature—was closely linked with the belief in a finely graded scale or chain of being. In this context, concepts and images associated with the principle of plenitude—the great variety of living forms, the progressive continuity between them, and the creative powers of nature—could serve as a powerful cultural resource for the proponents of transformist doctrines.

This is not to suggest that there were logical connections between such manifestations of plenitude and theories of evolution, but rather that this set of ideas was open to various interpretations and uses. For example, a notion of continuity could be accepted by those who defended the fixity of species. Thus, Buckland regarded fossils as supplying the links ‘that appeared deficient in the grand continuous chain which connects all past and present forms of organic life’. But when confronted with theories which exploited the idea of continuity as part of an argument for transmutation, writers maintaining the orthodox view qualified their meaning of the term, explaining that it


applied within, but not between, the four great divisions of the animal kingdom classified by Georges Cuvier. On the other hand, in promoting Lamarck’s work in Britain, Robert Grant explicitly rejected this restriction and sought to trace continuity, and increasing complexity, across Cuvier’s categories. He was also reluctant to acknowledge extinction, suggesting that ‘many fossil species to which no originals can be found, may not be extinct, but have gradually passed into others.’ Consequently, opponents of transmutation focused on the idea of continuity, and John Fleming was pleased to report that ‘the advocates for the existence of the “law of continuity” among created beings in their mutual relations, have experienced no small degree of pain from those chasms which so frequently present themselves’.

The distinction between conceptual and spatial plenitude acquired strategic importance here, for while rejecting the implications of conceptual plenitude such as a perfect chain of being, writers of natural theology did assume that all habitable parts of the globe were filled with life. It was this fact—and not the notion that all possible forms of life existed—which, in their view, accounted for the great variety and diversity of the organic creation. The geologist, William Conybeare, exemplified this position when criticizing Lamarck’s controversial speculations:

In the original formation of animated beings, the plan evidently to be traced throughout is this. That every place capable of supporting animal life should be so filled, and that every possible mode of sustenance should be taken advantage of; hence every possible variety of structure became necessary...

In this formulation there was a commitment to spatial plenitude but the variety of animal forms was explained in teleological terms. There is evidence that some authors of the Bridgewater Treatises, alerted by Lyell’s account of Lamarck, were sensitive to the different and often controversial interpretations of references to the fullness and variety of nature. They also attempted to qualify the principle of plenitude, and incorporated it within a teleological framework, thus protecting the concepts of purposive design and fixed species.

In discussing Paley’s response to ‘atheistic’ objections, we saw that he explicitly rejected the principle of plenitude which implied the actual existence of all conceivable forms. Within the more explicit debate of the 1830s on the question of species, John Kidd

41 Desmond, op. cit. (36), pp. 205–207.
42 Ibid., p. 201.
44 It is worth noting that such an assumption was not confined to treatises on natural theology. Lyell’s discussion of the replacement of extinct species and the filling of any vacant ‘stations’ in the natural economy appears to rest on suppositions about the ‘fullness’ of God’s creation. See Lyell, op. cit. (37), i, p. 140; ii, p. 130. For references to this and to the various relationships between the views of Lyell and Darwin, see M.J.S. Hodge, ‘Darwin and the Laws of the Animte Part of the Terrestrial System (1835–1837): On the Lyellian Origins of his Zoological Explanatory Program’, Studies in History of Biology, (1983), 6, pp. 1–106 (6, 23). Although the opponents of transmutation feared the connotations of conceptual plenitude, it would be wrong to see this notion as subsidizing Darwin’s theory of evolution. For the suggestion that Darwin saw nature as ‘full’ in the sense of all ecological niches being occupied rather than in the sense of a plenitude of forms, see D. Worster, Nature’s Economy: the Roots of Ecology. New York, 1979, pp. 157–158.
45 Quoted in Rupke, op. cit. (39), p. 174. Conybeare was writing in 1821.
Richard R. Yeo

and Charles Bell also regarded this as a dangerous notion. Referring to Paley’s remark about the possible existence of other animal forms, Bell argued that man’s ingenuity was in fact quite limited. All the fabled animals of antiquity—centaurs, satyrs, griffins—displayed no real novelty, suggesting that man’s inventions were merely ‘the incongruous union of things seen in nature’. Furthermore, he argued that such creatures could not survive because their structures were not internally adjusted nor adapted to the external environment. ‘Were such forms actually in being’, he concluded, ‘they must creep weakly on the ground’. Kidd agreed that ‘there is no ground, for supposing that nature has ever produced such an individual as a chimera or centaur’, and related this concern more clearly to the species question by tackling the problem of ‘lusus naturae’, or monsters. The phenomenon of malformations and monstrosities was used by proponents of transformist theories as evidence of the malleability of species: some of these forms were said to occupy intermediate positions in the scale of life, thus suggesting a possible mechanism of evolutionary change. But Kidd insisted that in all known cases ‘the character of the species, however obscured, is never lost’; that anomalous deviations were always within certain limits. He went so far as to suggest that these ‘anomalous productions’ may have been adapted, by the Creator, to serve special ends.

It was also crucial for writers of natural theology to ensure that allusions to the plenitude and fecundity of nature did not subsidize the concept of a continually active, natural mechanism of creation. William Kirby, who devoted the introduction of his Bridgewater Treatise to an attack on Lamarck and materialism, saw this notion as part of a tendency to substitute Nature for God. He regarded Lamarck’s hypothesis of spontaneous generation as part of a theoretical framework which made ‘nature . . . the real creator of all the forms and beings that exist’. Similarly, Kidd was anxious to avoid the suggestion that monsters resulted from a ‘sportive effort of the creative powers of Nature’, and in attempting to avoid this notion, explained that there was great variety within species and that this ‘wonderful diversity’ was ample manifestation of the infinite power of the Deity. This qualification matched Lyell’s answer to the ‘doctrine of transmutation’: namely, that deviations are always limited, that species have a ‘real existence in nature, and that each was endowed, at the time of its creation, with the attributes and organization by which it is now distinguished’. In this sense, speculation about transmutation which appealed to the diversity of organic beings was met with a reassertion of teleology: the perfect adaptation of species to their environment was the

49 Ibid., p. 338.
52 Lyell, op. cit. (37), ii, p. 65.
mode in which God had chosen to manifest and limit his designing powers. Within this framework, variety in animal forms did not reflect an independent principle or power of nature, but was explained in terms of purposive adaptation to different environments.

IV

Some recent work has drawn attention to the presence of an alternative, non-teleological conception of design in early nineteenth-century science and natural theology. Within the Bridgewater Treatises this was apparent in the case of Roget's contribution, which gave a generally favourable account of morphological notions such as the 'unity of composition' or type espoused by Etienne Geoffroy Saint-Hilaire. While he concurred with the dominant teleological tradition of British natural theology in underlining the image of adaptive diversity, Roget contended that this 'law of variety' was complemented and qualified by another principle: it was not blindly followed, but controlled by another law—'that of conformity to a definite type'. He thus made a significant departure from the teleology of Cuvier—a key authority for many of the Bridgewater Treatises—for whom any resemblances in the structures of animals derived from the functions they performed under similar 'conditions of existence'.

With Robert Knox, Martin Barry and William B. Carpenter, Roget suggested that there were certain features of animal structures—for example, vestigial organs—and certain parallels between them, which could not be explained by direct adaptation to function or environment, but could best be understood as permutations of a general plan or type. But unlike Knox, whose contempt for the current vogue of natural theology caused him to speak of the 'Bilgewater Treatises', he claimed that this morphological perspective strengthened the subject by allowing it to appeal to grand analogies throughout creation. He then proposed a view which incorporated both teleology and morphology, thereby anticipating the terms of reference for all future discourse within natural theology concerning the principles by which God had ordered the organic world:

We have seen that, in constructing each of the divisions so established, Nature appears to have kept in view a certain definite type, or ideal standard, to which, amidst innumerable modifications, rendered necessary by the varying circumstances and different destinations of each species, she always shows a decided tendency to conform.
There were three problematical areas within natural theology in which morphological concepts could be deployed. In different ways, these related to the general problem of revealing design amidst the variety and diversity of creation, intelligent and benevolent purpose behind the plenitude of nature. Firstly, as Paley realized, in order to dispel sceptical suggestions about a plurality of designers rather than a single God, it was important to evince not only marks of design but definite evidence for a unity of design.\textsuperscript{59} This had, of course, been one of the attractions of the chain of being, and writing in 1821, William MacLeay still spoke of the image of a progressive series as the most beautiful evidence of the truths of natural religion; and claimed that ‘until we can imagine ourselves acquainted with every possible production of this globe . . . naturalists can never be entitled to consider the chain of being as broken.’\textsuperscript{60} However, the Bridgewater Treatise authors were generally suspicious of this notion and Kidd, quoting Cuvier, ruled out any attempt to ‘class them [animals] so as to form a single series descending gradually from the higher to the lower’.\textsuperscript{61} Roget also rejected the idea of a single, simple, continuous series, remarking that ‘if, for the sake of illustration, we must employ a metaphor, the natural distribution of animals would appear to be represented, not by a chain, but by complicated net-work, . . . by circular or recurring arrangements’.\textsuperscript{62} Here he mentioned MacLeay’s ‘quinarianism’ and the concept of a ‘unity of composition’ which, he said, was being zealously pursued ‘by many naturalists, of the highest eminence, on the continent’.\textsuperscript{63} He believed that such perspectives, which stressed the analogies and symmetries pervading organic forms, offered better indication of a unity of design than the narrow teleological argument because they could show that apparent deviations, ‘far from being arbitrary, are themselves referable to particular laws’.\textsuperscript{64}

Secondly, the problem of accounting for monsters or apparent aberrations from species posed difficulties for those committed to the notion of final cause. As we saw earlier, John Kidd betrayed the strains involved here when he suggested, rather weakly, that monsters might be adapted to some special, but unknown ends.\textsuperscript{65} Furthermore, although proponents of this position emphasized the limits of deviations from normal species, they had no way of explaining the form which such deformities assumed. On the other hand, those who affirmed the idea of a morphological type as a governing principle,

\textsuperscript{60} W.S. MacLeay, Horae Entomologicae, London, 1819–1821, p. 169. MacLeay said that he had been told that his own theory of ‘a chain of being returning into itself militates against those notions of an ascending scale of nature, which are inculcated by revelation’.\textsuperscript{162}
\textsuperscript{61} Kidd, op. cit. (48), p. 333. Cuvier had asked: ‘What law would have unnecessarily constrained the Creator to produce useless forms, merely to fill voids in a chain, which is only a speculation of the mind?’ Quoted in Appel, op. cit. (50), p. 299. Adam Sedgwick still thought it necessary to attack the notion of a continuous chain of being as late as 1850. See A. Sedgwick, A Discourse on the Studies of the University of Cambridge, with additions, and a preliminary dissertation, 5th edn. London and Cambridge, 1850, pp. cxxxi–cxxxv. For an earlier rejection, see [Voltaire] The Philosophical Dictionary for the Pocket. London, 1765, pp. 72–73.
\textsuperscript{62} Roget, op. cit. (17), i, pp. 53–54.
\textsuperscript{63} Ibid., ii, p. 627.
\textsuperscript{64} Ibid., i, p. 50.
\textsuperscript{65} Kidd, op. cit. (48), p. 338.
with less stress on the criterion of adaptation, could use the phenomenon of monstrosities to their advantage. William Carpenter did this in his *Principles of General and Comparative Physiology* of 1839:

The tendency to conformity to an ideal 'archetype' is frequently shown, in a most remarkable manner, by the occurrence of *Monstrosities*, which, though once regarded by men of science with feelings very little higher than those with which they are still looked-on by the vulgar, may now be considered as among the most interesting and suggestive of all the illustrations of 'Unity and Design'; since of these malformations, a considerable proportion are such in virtue of their closer conformity to the *general* model, those modifications of it which are characteristic of the *special* form not having been evolved.66

Thirdly, there was the question of man's place in nature. Although it was accepted that animal life had its own value and did not simply exist for human use—a position difficult to sustain after the disclosure of a prehistoric period—Christian religious convictions demanded a conception of man as the special object of Divine Providence. In concluding his treatise, Roget raised the question of whether man could be considered as simply another product of the plenitude which characterized the organic world. But it was impossible, he said, 'to conceive that this enormous expenditure of power . . . and this profusion of existence . . . can thus, from age to age, be prodigally lavished, without some ulterior end'.67 Consequently, the vision of a progressive plan of creation, beginning with lower forms of life and culminating in man, had obvious attractions for writers of natural theology.68 The problem here, of course, was that it was precisely this notion of a progressive plan, so consonant with the idea of man as the denouement of creation, which reinforced theories of transmutation. As Buckland explained in his treatise, the word 'Development' contained several levels of meaning,69 and natural theologians were caught in the difficult position of needing to affirm organic progression and unity of design while at the same time rejecting any account of these phenomena by theories of descent. Roget realized this, and after giving a favourable account of recent morphological theories and the striking analogies on which they were based, stressed that there was still 'an impassable barrier of separation' between species, and castigated the extravagancies of 'continental physiologists', such as Lamarck.70

Thus, by the end of the 1830s, there were tensions associated with the problem of discerning the unifying design of a single Deity within the great diversity of living forms. Writers of natural theology were uncomfortable with earlier expositions of the principle of plenitude which celebrated this superabundance of nature as testimony to the notion that all conceivable forms of life exist. While they were enthusiastic about the image of a world in which all matter supported life, they firmly rejected the assumption that all conceivable or possible varieties of being should exist. They associated such a notion

---

67 Roget, op. cit. (17), ii, p. 640.
68 See ibid., ii, pp. 628–635 for Roget's interest in the 'law of Gradation' and embryology.
69 Buckland, op. cit. (16), i, p. 585.
70 Roget, op. cit. (17), ii, pp. 635–638. Referring to the discussion of transmutation in the *Philosophie Zoologique*, he remarked: 'If this be philosophy, it is such as might have emanated from the college of Laputa'. (638).
with atheistic or materialistic philosophies which substituted references to the energies or powers of nature—its fecundity, spontaneity or plasticity—for acknowledgements of a designing Deity. Thus, in dealing with the plenitude of nature they insisted that variety had limits, did not threaten the reality of species, and always existed for some adaptive or functional purpose. From this dominant teleological perspective, the splendid diversity of animal structures reflected the different environments in which they dwelt and the different functions they performed. However, those who favoured morphological theory argued that the concept of special adaptation to environment could not sufficiently account for the phenomena of the organic world, and claimed that in restricting itself to a narrow teleology, the subject of natural theology failed to provide the strongest evidence for design.71

The comparative anatomy of Richard Owen played an important part in mediating between these positions. After reading Whewell’s History, Owen wrote saying that only the present narrow basis of observation prevented a harmonious combination of ‘the transcendental and teleological views’;72 and in his major works he claimed that a strictly teleological theory could not account for the similarities which existed among animal forms. In 1849, Owen argued that ‘if we reject the idea that these correspondences are manifestations of some archetypal exemplar on which it has pleased the Creator to frame certain of his living creatures, there remains only the alternative that the organic atoms have concurred fortuitously to produce such harmony’.73 After thus raising the spectre of Democritus, Owen affirmed that the discovery of this archetype of the vertebrate skeleton provided the grandest evidence of Divine design. But, significantly, he did not totally reject the notion of final cause, and incorporated a teleological factor to explain adaptation to particular circumstances. It was this compromise which appealed to writers of natural theology, and Owen’s scientific work was seen as an illustration of the interdependence of teleology and morphology.74 But in spite of the shifts which had occurred since the 1830s, there were still tensions between these perspectives. There were two sources for these: firstly, references to unity of type or plan were not generally accepted as evidence of design in the same sense as examples of purposive adaptation;
and secondly, theories which emphasized morphological analogies and homologies in organic nature were often seen to be linked with theories of transmutation.  

V  

The issue which produced the most explicit confrontation between teleological and morphological ideas of design was that of the plurality of worlds. The doctrine of intelligent life on other planets became the subject of a public controversy between David Brewster, who defended what he took to be a popular orthodoxy, and William Whewell, who challenged it. The positive side of this question was largely constituted by assumptions about the manifestations of plenitude in creation; but furthermore, these were linked to arguments about final causes. In order to deny the plurality of worlds, a notion which he regarded as an ally of speculation about transmutation, Whewell was forced to qualify teleological inferences; in so doing he appealed to morphological interpretations usually associated with evolutionary theories. Since it was central to the subject of the controversy, the principle of plenitude was deeply implicated in a dispute which set the two concepts of design against each other and exposed the weakness of natural theology in dealing with the fundamental issue of man’s place in nature. Because the principle of plenitude—and in particular the corollary of the plurality of worlds—had entered natural theology, any attempt to assert the Christian notion of man’s special relationship to God revealed the tensions between the intellectual vocabulary of this discourse and its apologetic function.

Since the seventeenth century, the idea of other intellectual worlds was also coupled with an explicit qualification of narrow anthropocentrism: not all features of God’s creation, either on earth or in the heavens, were made for man’s use. But the habitation

75 See, for example, W. Whewell, *The Philosophy of the Inductive Sciences*, 2 vols. London, 1840, i, p. 629 for the statement that: ‘The regular form of a crystal, whatever beautiful symmetry it may exhibit . . . does not prove design in the same manner in which design is proved by the provisions for the preservation and growth of the seeds of plants, and of the young of animals’. Sedgwick wrote to Louis Agassiz expressing anxiety about ‘the opinions of Geoffroy St. Hilaire and his dark school’, warning that these would ‘shut out all argument for design and all notion of a Creative Providence’. A. Sedgwick to L. Agassiz, 10 April 1845, in J. Clark and T. Hughes (eds.): *Life and Letters of the Reverend Adam Sedgwick*, 2 vols. Cambridge, 1890, ii, p. 86. For the connection between morphology and transmutation in the contemporary debates, see Powell, op. cit. (35), p. 392.

76 For an extensive study of this controversy which argues that Whewell’s rejection of the plurality of worlds was a disguised attack on theories of transmutation, such as that of Robert Chambers, see J.H. Brooke, ‘Natural Theology and the Plurality of Worlds: observations on the Brewster–Whewell Debate’, *Annals of Science*, (1977), 34, pp. 221–286. For the connection with Whewell’s epistemology, see Yeo, op. cit. (53). See also W.C. Heffernan, ‘The singularity of our inhabited world: William Whewell and A.R. Wallace in dissent’, *Journal of the History of Ideas*, (1978), 39, pp. 81–100.


of these worlds was still rationalized by the concept of final cause: other planets did not exist for their own sake but in order to support life. In this way, the principle of spatial plenitude—the notion that all possibly habitable parts of the universe were filled with life—was fortified by teleological reasoning: other planets had been created for the use of intelligent populations.

Brewster's defence of the plurality of worlds took this form. In his view, the plenitude of creation was synonymous with the axiom that matter was made for life. To contemplate the prospect of uninhabited planets was to imply that they had been made in vain; if other worlds were devoid of life they would exist without purpose or final cause, a situation incompatible with the idea of a rational creation:

In peopling such worlds with life and intelligence we assign the cause of their existence; and when the mind is once alive to this great truth, it cannot fail to realize the grand combination of infinity of life with infinity of matter.79

Whewell offered a perceptive summary of these assumptions:

It is sometimes said, that it is agreeable to the goodness of God, that all parts of the creation should swarm with life: that life is enjoyment; and that the benevolence of the Supreme Being is shewn in the diffusion of such enjoyment into every quarter of the universe. To leave a planet without inhabitants, would, it is thought, be to throw away an opportunity of producing happiness.80

In order to counter this position he argued that the extreme principle of plenitude which it embodied ignored the actual state of affairs on Earth; it overlooked the large areas of this globe which did not contain life. But he also drew attention to the ways in which the superfecundity of nature routinely involved waste (in the sense of unrealized potential) and abortive design.

To work in vain in the sense of producing means of life which are not used, embryos which are never vivified, germs which are not developed, is so far from being contrary to the usual proceedings of nature, that it is an operation which is constantly going on, in every part of nature.81

79 D. Brewster, More Worlds than One: the Creed of the Philosopher and the Hope of the Christian, new edn. London, 1867, p. 183; first published in 1854. See also T. Dick, Celestial Scenery; or the Wonders of the Planetary System Displayed. London, 1871, p. 343 for the remark that 'so far as we are able to penetrate, it appears demonstrable that matter exists chiefly, if not solely, for the sake and convenience of sensitive and intelligent beings'. Yet it should be noted that this strong nexus between matter and life had already been questioned by the pre-organic eras revealed by geology. Buckland admitted this in his Bridgewater Treatise, op. cit. (16), i, pp. 56–57, and Whewell capitalized on it in his argument with Brewster.


81 Ibid., p. 330. Compare the following passage from Darwin's Origin of Species, 1859, ed. J.W. Burrow, Harmondsworth, 1968, p. 116, cited in Gale, op. cit. (25), p. 329: 'We behold the face of nature bright with gladness, we often see superabundance of food; we do not see, or we forget, that the birds which are idly singing round us mostly live on insects or seeds, and are thus constantly destroying life'. Hume had exploited this theme in his attack upon natural theology: 'What an immense profusion of beings, animated and organized, sensible and active! You admire this prodigious variety and fecundity. But inspect a little more narrowly . . . 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!' D. Hume, Dialogues Concerning Natural Religion, 1779, (ed. H.D. Aiken), New York, 1948, p. 79.
Whewell’s emphasis on these prodigal and abortive features of creation was a challenge to the optimistic image of nature usually associated with the principle of plenitude. It also indicated a shift in the strategy for dealing with the unwanted implications of this assumption, within writings on natural theology. While authors such as Bell and Kidd had constrained plenitude by tying it to utility in order to protect the idea of fixed species, Whewell stressed the waste which it entailed in order to assert the uniqueness of life on earth. Furthermore, whereas other natural theologians had been anxious about the affinities between the principle of plenitude and various materialistic or pantheistic philosophies, it was Whewell, in his denial of the plurality of worlds, who was seen as the effective antagonist of such tendencies. Although most notices of Whewell’s book were critical, there were two reviews which praised him for reasserting a Christian view of God’s power over nature. In defending Whewell, the Catholic periodical, the Rambler, charged Brewster with materialist leanings because he had treated matter as something that made demands upon the Deity, something that had to be filled with life; he was therefore seen as a member of the school which ‘think matter is a self sufficient being, over which God has plastic power to form, but not substantial power to create or annihilate’. Similarly, the Eclectic Review welcomed Whewell’s argument as ‘a timely blow to [the] Nature-worship’ of Carlyle, Emerson, Combe and Chambers. In stressing examples of waste and abortive design, Whewell had shown that Nature was not perfectly formed, not a living animal, but rather ‘clay in the hands of an almighty Potter’; and in doing so he underlined the need to worship God rather than nature, to profess Christianity not Pantheism.

These comments point to tensions between aspects of Christian doctrine and the neo-Platonic assumptions about the natural world which had entered the discourse of natural theology. Whewell felt it necessary to attack the principle of plenitude, which legitimized a plurality of worlds, in order to safeguard the Christian idea of man’s unique relationship with God:

The thoughts of Rights and Obligations, Duty and Virtue . . . are thoughts which belong to a world, a race, a body of beings, of which any one, with the capacities which such thoughts imply, is more worthy of account, than millions and millions of mollusks and bellemnites, lizards and fishes, sloths and pachyderms, diffused through myriads of worlds.

But in doing so he was forced to deny many of the features of creation which had been celebrated as marks of design in natural theology.

A critique of the traditional concept of final cause was also central to Whewell’s case against the plurality of worlds. In exposing the connection between plenitude and waste, he was indicating that there were aspects of creation which did not betray design in the

84 [Whewell] Of the Plurality of Worlds. 1853, printer’s copy containing chapters cancelled from published work, Whewell Papers, Trinity College, ADV.C.16.27, 245. Sedgwick appears to have thought Whewell’s book might encourage Pantheism. Whewell could not see the logic of this objection and protested that: ‘The proper antithesis to Pantheism is not intelligent creatures besides man, but a Divine Mind’. Whewell to Sedgwick, 8 June 1854, in J. Stair Douglas, The Life and Selections from the Correspondence of William Whewell, 2nd edn. London, 1882, p. 434.
sense of purposive or functional utility. Yet in the Bridgewater Treatises the affirmation of this strict teleological notion of design was regarded as essential to the doctrine of the immutability of species. As we saw earlier, Whewell himself endorsed this position in 1837 in his History. Like the Bridgewater authors, he too wanted to reject theories of transmutation, but believed that such theories were thought to be strengthened by the popular belief in a plurality of worlds—an association made in the anonymous Vestiges of the Natural History of Creation which appeared in 1844.85 In rejecting the proposition in his own anonymous work of 1853, Whewell attempted to assert the uniqueness of intelligent life on earth,86 and therefore had to confront the teleological thinking which postulated life as the raison d’être of matter. It was in this context that he appealed to Owen’s work, because it allowed him to claim that the traditional concept of final cause could not provide a comprehensive account of creation. Repeating Owen’s critique of teleological explanations in comparative anatomy, Whewell stated that many parts of the structure of animals, though adapted for particular purposes, are yet framed as a portion of a system which does not seem, in its general form, to have any bearing on such purposes.87

Once this particular lack of practical purpose was acknowledged, it became possible to assert that the planets need not support life: their existence could be part of a wider plan independent of anthropomorphic notions of utility. But furthermore, the morphological concept of design which Owen’s work had successfully promoted allowed Whewell to contend that there were other principles which pervaded the universe—laws of symmetry, resemblance, analogy and beauty. He remarked that

there may be large portions of the Creation in which we cannot trace any design for the good of sentient beings; and in which we must suppose that the symmetry and beauty and variety which exist, exist on their own account, and as a manifestation of Law directed to no purpose such as we can understand.88

After stressing the manifestation of such general laws, he argued that these must have been known to God before being actualized, and that in discerning such laws, man shared an affinity with ‘the Divine Mind of the Creator’.89 For Whewell, this ability of man to share in Divine thoughts, including the perception of his own place in the plan of creation, provided a striking legitimation of the uniqueness of intellectual life on this planet:

86 Whewell did admit the possibility of animal life on other planets but not the existence of other moral, intellectual beings. Whewell, op. cit. (80), p. 112, 118.
88 Whewell, op. cit. (84), p. 269.
89 Whewell, op. cit. (80), p. 360; also pp. 363–364.
we have, in this, a reason which may well seem to us very powerful, why, even if the Earth alone be the habitation of intelligent beings, still, the great work of Creation is not wasted.\textsuperscript{90}

Whewell thereby rejected the principle of spatial plenitude, but, recognizing the appeal which it commanded, proceeded to supply an alternative. He suggested that the existence of life was not the only manifestation of providence; it could be equally indicated by the action of physical forces and laws which God sustained. In this sense, he claimed, even ‘the remotest planet is not devoid of life, for God lives there’.\textsuperscript{91}

Whewell’s references to non-teleological features of creation went beyond references to symmetry, analogy and order. He contended that there were aesthetic values informing man’s response to the sublime (and irregular) beauty of nature. Having proposed this additional, and profound, level of empathy with the Divine mind, Whewell felt confident in affirming the relationship between man and God, above the principle of plenitude, as the most significant aspect of creation. Dignity and sublimity, he suggested, ‘appear especially to belong to the larger objects, which are destitute of conscious life; as the mountain, the glacier, the pine-forest, the ocean; since in this, we are, as it were, alone with God, and the only present witnesses of His mysterious working’.\textsuperscript{92} In seeking to affirm the uniqueness of man’s status, Whewell thus exorcized the assumptions about plenitude apparent in earlier works of natural theology. Whereas Paley found purpose in the abundance of mice and gnats in barren places, Whewell felt compelled to ask

whether the dignity of the Moon would be greatly augmented if her surface were ascertained to be abundantly peopled with lizards; or whether Mount Blanc would be more sublime, if millions of frogs were known to live in the crevasses of its glaciers.\textsuperscript{93}

VI

This article has focused on the metaphysical assumption which Lovejoy called the principle of plenitude. While not committing itself to the programme of a ‘history of ideas’ outlined by Lovejoy, it has attempted to study the trajectory of this assumption in a period beyond the compass of \textit{The Great Chain of Being}, and in the particular framework of the discourse of natural theology. This subject sought to evince the marks of Divine design and power in the natural order, and in doing so, referred to the fertility and abundance of living things. However, the earlier formulations of the principle of plenitude, as presented by Lovejoy, appear to have undergone significant modulation in the early nineteenth century. I have argued that in the context of anxieties about theories of transmutation, there was a rejection of what may be called conceptual plenitude and a continuing acceptance of spatial plenitude. This sensitivity of natural theologians to

\begin{itemize}
  \item \textsuperscript{90} Ibid., p. 364. Owen had in fact inferred the possibility of different forms of life on other planets from the non-existence of possible permutations of the archetype on earth. And in contrast with his other qualifications of teleology, Owen suggested that the support of life was ‘the only conceivable purpose’ of the planets. See Owen, op. cit. (73), pp. 83–84.
  \item \textsuperscript{91} Whewell, op. cit. (80), p. 366. For a similar notion, see A. Sedgwick, \textit{Discourse on the Studies of the University of Cambridge}, 3rd edn. Cambridge, 1834, pp. 106–107.
  \item \textsuperscript{92} Whewell, op. cit. (80), p. 365.
  \item \textsuperscript{93} Ibid., p. 366.
\end{itemize}
ideas about the protean powers of nature and the plastic and diverse character of its forms reflected their need to defend the immutability of species, a notion closely associated with the conceptions of teleological design which they espoused. There were attempts to constrain the concept of plenitude by subordinating it to teleology, explaining the variety of organic life in terms of its adaptive purpose, and its extent in terms of the proposition that matter was made to sustain life. This was one approach to the problem of delineating the plan and purpose of the natural world. But there were problems confronting this approach, at both scientific and theological levels, which related to the features of creation associated with the principle of plenitude: for example, the phenomena of monsters and aberrations, the variety of form and function, the possibility of a plurality of designers, and the status of man amidst the profusion of organic life.

The alternative morphological theory, present in Roger’s Bridgewater Treatise, dealt with such issues by embracing the phenomena of variety and diversity within transcendental concepts such as archetype and unity of composition, which went beyond the concentration on adaptive utility and final cause. Throughout the second quarter of the century there was debate about the relationship between the teleological and morphological concepts of design within natural theology. Several important writers argued for the complementary character of this relationship, but in the controversy over the plurality of worlds—a doctrine in which plenitude was the constitutive assumption—those two concepts were opposed in a dispute which involved the integrity of natural theology and its account of man’s place in God’s creation. Whewell’s argument against the plurality of worlds involved him in a critique of both the principle of spatial plenitude and the traditional notion of design. He exposed the ways in which plenitude was not always realized, and the cases in which its manifestations were inconsistent with the notion of final cause.94 In challenging the sufficiency of teleological accounts of creation, he appealed to the morphological theories which emphasized the symmetry and order of nature. This perspective was compatible with his attempt to affirm the unique character of man’s mind which, in discerning such general laws, indicated its special relationship with the Deity. It is both ironic and significant that in seeking to promote a non-evolutionary account of man’s place in nature, Whewell was forced to qualify teleological conceptions of design and to embrace morphological notions often associated with theories of transmutation. This situation underlined the potential conflict between Christian doctrine and the neo-Platonic assumptions about the world which had entered the discourse of natural theology. Although the eighteenth-century concept of plenitude had been severely qualified by early nineteenth-century writers concerned with the question of species, Whewell found it necessary to make an explicit rejection in order to assert the uniqueness of man. But in doing so, he revealed the extent to which the principle of plenitude had become implicated in serious tensions within natural theology over the key issues of design and the place of man in nature.

94 Heffernan, op. cit. (76), p. 96 remarks that ‘the dissenters [the opponents of the plurality of worlds] were moved by a belief in the intricate design of creation and the sufficiency of man as an end to himself’. But in Whewell’s case, as argued above, the affirmation of man’s uniqueness was linked with some severe qualifications of the notion of design.