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PROGRESS AND DIRECTIONALITY IN SCIENCE, THE  
HUMANITIES, SOCIETY AND EVOLUTION

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Keywords: progress, directionality, science, humanities, society, history, evolution.

ABSTRACT

This essay discusses progress and directionality, both in nature, in science and in society, treating as its starting-point the reflections, parallelisms and comparisons of Ruse's essay, 'A Threefold Parallelism for Our Time? Progressive Development in Society, Science and the Organic World', but reaching substantially different conclusions. The essay thus ranges over progress and directionality in the world of natural evolution, in the sciences and the humanities, and in history and society. It defends non-relative progress in science and the humanities, criticising here both the approach to these disciplines of the strongly evolutionary epistemology of Hull and the more moderate evolutionary epistemology of Ruse. It further defends

the possibility of progress and directionality in history and society, and also, following Rolston, in the course of evolution within the world of nature, where the kind of directionality to be found has multiple directions rather than being unilinear.

Subsequently it relates conclusions about these fields to theological reflections (characteristic of Judaism, Christianity and Islam) about the creation of nature and society by a value-loving intelligence.

## 1. INTRODUCTION

In this essay I discuss progress and directionality, both in nature, in science and in society. Much the same enterprise was pioneered by Michael Ruse, in his essay 'A Threefold Parallelism for Our Time? Progressive Development in Society, Science and the Organic World' (1). Such parallelisms and comparisons will also be considered in this essay, but with different conclusions. This essay accordingly ranges over progress and directionality in the world of nature, in the sciences and the humanities, and in history and society. Subsequently I

relate conclusions about science, society and nature to theological reflections concerning a creative and value-loving intelligence; this section will address the emergence of value and its gradual but belated appearance both in nature and in culture.

Before more is said, a few words are in place to clarify the notions of progress and of directionality. Progress, as Ruse remarks, involves change (many would say ‘a process of change’) that has (or, we might add by way of qualification, usually has) a linear character. (Change that doubles back on itself or repeats itself, as Ruse at once comments, can hardly count as progress.) In addition, it involves improvement, on one criterion or another. If subsequent stages are not under some description better than the ones that preceded them, then neither they nor the process that produced them amount to progress. (2) However, the criteria of progress diverge. While scientific progress is often regarded (at least by realists) as involving a greater approximation to the truth, social progress is liable to

betoken either enhanced welfare, or greater freedom, or moves towards justice or towards equality. In what follows, appropriate criteria will be specified as and when they become relevant.

Directionality is both broader and narrower than progress. It too involves change, and change that is either directed towards an agreed direction or destination or that moves undirected in one direction or another. Although not all directionality is progressive, often it is such, involving improvement, at least from the perspective of those who welcome the direction or directions in question. Directionality, however, need not involve change taking place in a single direction, but can involve change in multiple directions, sometimes simultaneously. As we shall see, a possible model of the history of life on earth is one involving multiple directionality. (Some might say the same, in an adjusted sense, about human culture.)

## 2. HISTORY AND LAWS OF PROGRESS

The once prevalent belief in progress towards human happiness understood as pervading the entire course of human history has widely been discarded. From the Enlightenment into the early twentieth century, this belief was held so strongly that philosophers such as Condorcet, Saint-Simon, Comte, Hegel, Marx and Spencer competed to articulate actual laws of progress, manifested in history and governing its evolution. By ‘progress’ was meant change involving improvement, whether the improvement was intellectual, social or political, or all of these together. The story of the different versions of this belief can readily be found in works such as J.B. Bury’s *The Idea of Progress*, John Baillie’s *The Belief in Progress*, and Robert Nisbet’s *History of the Idea of Progress* (3). Given such laws, the patterns and the unfolding of history would have had a character of inevitability.

But two World Wars largely shattered this belief, particularly with regard to social and political progress, but to some extent with regard to progress in general. Not only was doubt cast on

laws of history, but often also on actual belief in progress, or at least on progress having favourable prospects. As the various metaphysical underpinnings of progress ceased to be credited, so did people's remaining reliance on progress itself.

With regard to laws of history, a significant impact on their tenability was generated by an argument of Karl Popper in *The Open Society and Its Enemies*. Popper concluded that there are no laws of history, because whatever predictions may be made about people's behaviour, human beings have the capacity to falsify them by choosing to respond or act differently, and not as predicted. By contrast, the belief that history unfolds in accordance with laws of history deprives us of our responsibility (4). Since history is in large measure the outcome of people's choices, it cannot be regarded as governed by laws that are supposed to have effect regardless of such choices.

Popper should not be regarded, however, as a critic of all belief in progress. What he objected to was historicism, or large-scale

attempts to predict the human future, to which he further objected that human action is considerably affected by human knowledge, and that the future of human knowledge is itself unpredictable (5). Yet he maintained that in some circumstances, scientific progress is assured and will be made (6), and also discusses its prospects and possible obstacles (7); and in other writings he took pains to rehabilitate the reputation of Xenophanes, the earliest Western defender of belief in progress on the part of humanity with regard to its understanding of the physical world (see below) (8).

Furthermore in *Conjectures and Refutations* he spells out the distinction between belief in historical laws of progress, which he rejects, and his own belief that continued growth is characteristic of and essential to scientific knowledge, despite the dangers that it may be blocked or retarded (9).

Nevertheless the kind of belief that represents progress as law-governed and inevitable was now widely discarded, even where belief in progress itself survived. An example of this trend can



already be found in the view of the early-twentieth-century historian Herbert Butterfield, who, in *The Whig Interpretation of History* (1931), contended that historians should eschew interpretations and interpretative frameworks altogether (10), and therewith any tendency to appeal to would-be historical laws. Yet at the same time Butterfield retained belief in the operation of providence within history, producing progressive outcomes sometimes in conflict with the intentions of the relevant agents (11). Butterfield's own consistency in rejecting interpretation in history and at the same time continuing to discern the workings of providence can be questioned (12); but his overall stance manifests the possibility of rejecting laws of history without completely abandoning belief either in progress or in directionality at the same time.

Belief in the kind of progress that is guaranteed by historical laws was more widely discarded still with the widespread demise of the influence of Marxism in 1989. Paradoxically we might well, in the light of Popper's arguments, regard the related

abandonment of belief in the inevitability of progress as progress itself, whether progress in history, the philosophy of history or in metaphysics. But the issue of whether progress either in science or in humanities such as history is possible is debated, and will shortly be considered, after consideration has first been given to the relation of Darwinian evolution to progress.

### 3. EVOLUTION AND PROGRESS

The increasing adoption across the early part of the twentieth century of the Darwinian synthesis (13) eventually fostered a corresponding belief about the absence of progress in the evolution of species by natural selection. If what survives is what is fittest to survive, whether through out-predating or out-breeding competitors or by occupying a distinctive, survival-friendly niche, then surviving species need be no more intelligent than the ones they outlive, and in some cases will be parasites that survive through dependency and at the same time through predation on species with greater consciousness and

understanding. The adoption of this synthesis did not lead at once to a discarding of belief in progress, for, as Michael Ruse relates, '[t]he great mathematicians who synthesized Darwinian selection with Mendelian genetics – R.A. Fisher, J.B.S. Haldane and Sewall Wright – were all ardent progressionists' who 'saw no incompatibility between their evolutionism and progressionism' (14). But, as Ruse proceeds to recount, the next generation of evolutionists, '[m]en like Theodosius Dobzhansky and George Simpson and Ernst Mayr and G. Ledyard Stebbings ... set out deliberately to cleanse their work of progressionist language and descriptions and mechanisms and conclusions' (15), seeing this as a requirement of a professional, value-free approach.

The waning of belief in law-governed progress permeating human history may have had an impact on attitudes to nature, in particular producing a reduced willingness to discern progress across the course of evolution. The problem here was not the inapplicability of laws of nature, but a lack of confidence in the

passage of time displaying any progressive tendencies at all. If there is little or no sign of purposiveness in human history, and the consciousness of such purposiveness underwent a decline, then the inclination to detect directionality or progress within the processes of the natural world could well have been correspondingly reduced at the same time. As has been mentioned, Michael Ruse has discussed in one of his essays some possible parallelisms between the development of society, the development of science, and the (evolutionary) development of organisms (16). In this essay I will refer to his treatment of this triple theme, but will be investigating not so much parallels as different grounds and different criteria for recognising both directionality and progress.

In any case it has become a commonplace among philosophers of science (and philosophers of biology in particular) that there is no discernible purpose in the world of nature, and no discernible directionality either. Since evolution proceeds through natural selection, with its focus on survival, there is no

requirement for the survivors (whether species or individuals) to be superior, let alone nobler, than their predecessors, for survival can be due to factors other than intelligence, versatility, initiative or character. Natural selection depends mainly on adaptation, and adaptation takes many forms, far from all of which are in any way progressive, or so it is widely held.

Some theorists, however, have taken the view that this conclusion went too far. Holmes Rolston, for example, wanted to keep room for the ‘step up, lock up’ aspect of evolution, whereby evolutionary achievements such as sight or creativity, once achieved, are somehow preserved rather than eliminated, and sought to supplement Darwinian explanations so as to accommodate it. However ‘groping, blind and unmerciful’ the system of nature ‘may otherwise seem’, ... ‘out of seeming disorder, order comes the more. There flows this great river of life, strange and valuable because it flows ... uphill, negentropically from nonbeing to being, from nonlife to objective life and on to subjective life’. (17). This stance did not

require an abandonment of Darwinism (certainly not in Rolston's own self-understanding or, we might add, at all), but suggested that Darwinism, with its characteristic implicit abandonment of directionality, was not the whole story.

Other philosophers, however, have applied the view that there is no directionality or progress in nature to the sphere of science itself, on the ground that science is nothing but an outgrowth of evolutionary processes. This latter account of science can be found in Stephen Toulmin's article 'The Evolutionary Development of Science' and his subsequent book *Human Understanding* (18). In the earlier essay Toulmin wrote:

Science develops ... as the outcome of a double process: at each stage, a pool of competing intellectual variants is in circulation, and in each generation a selection process is going on, by which certain of these variants are accepted and incorporated into the science concerned, to be passed on to the

next generation of workers as integral elements of the tradition. (19)

Thus selection within science is compared to selection within nature; and a few pages later Toulmin affirms that he intends this comparison to be taken seriously, and not just as a figure of speech (20). While it was not obligatory to accept that what holds good in the realm of natural selection holds good also in the realm of the kind of purposive selection that characterises human undertakings such as natural science, it now became possible to hold that what survives and succeeds in science is what captures attention in relevant universities, schools and journals, and that this need not be the most incisive or the most penetrating work, as opposed to being the fittest to win followers and secure influence and thus survive. Nor was Toulmin a lone voice; for Popper himself endorsed evolutionary epistemology in his 1972 book *Objective Knowledge* (21). In the coming section, this approach to human intellectual undertakings such as the sciences is taken further. After that, I

will be returning to issues of directionality and progress in evolution and thus in nature.

#### 4. THE SCIENCES AND THE HUMANITIES

Cultural developments thus came to be seen as a function of a kind of natural selection which selects between hypotheses or even between paradigms. Despite the obvious differences between science and natural evolution, such as the intentionality of changes in science and the apparent absence of intentionality in nature, philosophers of science such as David Hull have contended that the common element of selection was the crucial one, and that the process by which science develops consists in competition between scientific schools or groupings, as well as competition within such schools, and also in reputational success for scientists who lobby and network most effectively in the promotion of their hypotheses and interpretations.

According to Hull, ‘scientists behave in ways calculated to get their views accepted as their view by other scientists’ (22), and ‘The factionalism that scientists themselves so often decry



facilitates rather than frustrates progress in science' (23). Thus it is its fitness to survive within scientific society that qualifies scientific work for scientific acceptance, rather than (say) its rationality. And implicitly there is little or no reason to regard the current state of science as better than previous stages, or to regard science as embodying either directionality or progress.

But this understanding of science has been potentially problematic for philosophers of science themselves, as they have had to regard their own work (if the evolutionary story is accepted) as lacking any kind of superior rationality, and as successful, if it was successful, on the basis of its persuasiveness and consequent popularity, rather than of its superior intellectual content and merits. Successful hypotheses, strictly speaking, were not bound to explain the phenomena better, or to explain a wider range of phenomena than rival hypotheses, for they were successful on the strength of their fitness to survive, which was not invariably the same thing.

But if theories are sometimes accepted or rejected for good reasons, through the exercise of rational choice and discrimination, then there remains scope for belief in progress (involving enhanced understanding of reality), at least within the sciences. Take Darwinism itself; arguably it was accepted because it explained the phenomena of the species and speciation better than rival theories, and was in due course vindicated as the phenomena that it predicted were seen to occur, and when, in conjunction with Mendelian genetics, it proved capable of explaining inheritance as well. But to accept this is to regard Darwinism as an improvement on previous theories. An important aspect here is the way in which human beings are capable of discriminating between better and worse explanations, and forming beliefs for reasons. To the extent that this process informed the widespread acceptance of Darwinism, that acceptance has to be regarded as an example of epistemic or scientific progress.

To return, however, to Hull's evolutionary account of science, it is worth noting here his proposed definition of 'selection': 'a process in which the differential extinction and proliferation of interactors *cause* [his italics] the differential perpetuation of the replicators that produced them' (24). This definition is intended to apply to selection not only in organic evolutionary contexts, but to conceptual selection in science as well; this is attested by Hull's claim of a few pages later: 'My concepts have the added virtue that they are sufficiently general to apply to conceptual evolution as well, in particular to conceptual selection in science.' (25) (Thus the scope of this account of selection includes disciplines such as history and literary criticism as well as the empirical sciences.) Hull recognises that some selection is intentional and some is not, but regards this as no problem for this analysis. But his analysis and his definition of selection at the same time appear to minimise the significance of the rational element in scientific reasoning and endeavour, as if selection within science (and more generally within culture) did not involve the adoption of one rather than another hypothesis for

reasons, unlike selection in the sense of ‘natural selection’. Hull later refers passingly to ‘rational selection’, but concludes that ‘the effects of intentionality’ make comparatively little difference. (26)

This view of science has been criticised by Michael Ruse. In particular, Hull’s treatment of science, according to Ruse, ‘fails to account for’ the ‘sense of progress that we have ... about science’. ... ‘It makes good sense to say that Mendel was ahead of his predecessors, just as Watson and Crick were ahead of their predecessors. Yet ... our biological evolution is not progressive’ (27). So scientific change and evolutionary change may be radically different, although Ruse here declares himself convinced neither by those who assert actual progress in science nor by those who deny it (28).

Hull may well be right, or largely right, about the characteristic motivations of scientists, and also about the important social aspects of scientific development. But it does not follow that

scientists (either in the role of researchers or in that of peer-reviewers) cannot and do not exercise rational discrimination in appraising new theories, and do not sometimes produce better hypotheses and explanations than their predecessors, and sometimes ones rightly recognised as such. Ruse explains how there are several varieties of evolutionary epistemology, and that not all regard the validity of new theories as relative to their social and intellectual context (29). Hull's approach, by contrast, appears to make apparent progress in science relative to the local conditions of acceptability, just as he considers apparent advances in natural evolution to be relative to the spatial and temporal niches of the participants.

Hull's account of science as a process is characterised by his understanding of scientific ideas as memes, units between which selection can take place comparable to the biological units of genes, which are central to the process of natural selection. (30)

But this way of treating ideas as if they operated through causal powers analogous to those of genes confers on their selection

and reception a deterministic character that further elides the rational role of individual scientists. Thus interpreted, science is less likely to appear capable of rational advances, given the apparent beguilement of scientific researchers by the power of memes to infiltrate their way into scientific brains. But if scientific ideas are regarded not as memes but as rational activity, purposefully and actively shared, sifted, amended and tested, a different picture emerges which is less hostile to genuine scientific progress being made, progress not needing to be regarded as invariably relative to the local situation, and capable of being regarded as better reflecting the nature of the phenomena studied. (I have discussed memes in greater detail elsewhere (31).

For his part, Ruse, despite finding much to endorse in Hull's account, emphasises a key disanalogy between conceptual change in science and evolutionary change in nature. As he puts it, 'new elements of science seem in some sense to be directed or teleological, whereas the whole point about the new elements

of the organic world is that they are not so directed or teleological' (32). Thus the very purposiveness and non-randomness of Eldredge and Gould's punctuated equilibrium theory meant that there was not the same need for natural selection to work on it as there is when random variants appear in the realm of natural selection (33). For the actual aim is to produce a theory closer to the truth.

Here it would be appropriate to comment that Ruse's disanalogy turns not only on the intentionality of scientists (a point that Hull recognises and is untroubled by) but on their ingenuity and rationality. This is what makes scientific debates different from evolutionary struggles and competition, as the rational advantages of new proposals are related to and integrated with existing and newly discovered data and theories. Yet Ruse writes as if his disanalogy turned mainly on intentionality, as he now quotes an extensive passage of Hull on this topic, and (to his surprise) finds that he agrees with it. What is really more surprising is this: Hull accepts at one stage in this passage that

‘Conceptual evolution, especially in science, is both locally and globally progressive’, and attributes this fact to the intentionality of scientists (34). As we have seen, however, this feature of science is due to more than intentionality, and its recognition appears to involve a major concession from Hull, as a social relativist, to his more progressivist opponents and critics.

Opponents of progressivism in science might here appeal to the sceptical arguments of Larry Laudan, who argues impressively against several kinds and varieties of realism and progressivism about science. Laudan, however, does not deny the possibility of scientific progress, but actually supplies criteria for recognising it. Thus ‘If  $T_N$  has more confirmed consequences (and greater conceptual simplicity) than  $T_O$ , then  $T_N$  is preferable to  $T_O$  ...’ even if  $T_N$  cannot explain the explanatory success of  $T_O$  and does not incorporate its component theories’ (35). While this is not the only possible characterisation of progress, it suffices to demonstrate the possibility of a succession of such advances, while also showing that not all new theories incorporate



whatever items made their predecessors appear successful. Progressivists need not claim that every new theory is superior to previous theories in the same field, but assert that some are, and that there can be a sequence of such advances across time. Nor must progressivists invariably be realists (although they may be more consistent if such they are (36)); for instrumentalists (for example) could also credit sequences of advances, all satisfying Laudan's characterisation, and thus adhere to progressivism. Indeed the debates about progressivism and about realism to some degree concern independent issues.

Parallel debates to those concerning Hull's relativist view of science could readily be conducted on whether there is progress in historiography, or in other humanities disciplines such as literary criticism or philosophy. Followers of Hull could easily apply their kind of evolutionary epistemology to these disciplines, and employ the models of selection, of fitness to survive, and of a competition between memes to their debates. Yet a parallel reply could be made, that in these connections too

it makes sense to talk of progress being made, whether in understanding the past, in interpreting literature, or in appraising philosophical theories and concepts. Here too the debates cannot be understood as a contest between memes to colonise populations of researchers, as opposed to the active discrimination of research communities in sifting the wheat from the chaff of explanatory theories and interpretations. And here too, it is the rationality of the participants that an evolutionary epistemologist of Hull's variety would find it hardest to accommodate. While evidence of actual progress in these fields may be rare and elusive, the rational nature of these undertakings seems in the end to make it possible for such progress to be made, as is also the case in science. An example of such progress can be found in the discovery by Milman Parry and Alfred Lord of the oral transmission of the Homeric poems over many centuries by a whole succession of minstrels (37).

Thus the possibility of cultural progress based on reasoning cannot be restricted to the natural sciences. Consider Popper's

own work (already mentioned above) on the philosopher Xenophanes, the philosopher who declared that the gods did not reveal everything to humanity from the start, allowing them space to get to understand things better. Popper contrived to vindicate Xenophanes against calumnies (both ancient and modern) which represented him as holding the ridiculous view that the earth is infinite, explaining this misinterpretation as a mistaken construction of one of the surviving fragments, which has a clear and sensible but different meaning (38). This argument of Popper in the realm of the history of philosophy can reasonably be held to amount to progress itself, the very possibility that Xenophanes had declared the gods to facilitate (39). Now Popper also argued that Xenophanes was the earliest adherent of the method of conjectures and refutations (40), which he has shown to be a fruitful method in the course of the later history of science (e.g. in the work of Johannes Kepler) (41). I have argued in reply that Xenophanes need not be understood in this way, since he seems to have also supported rival methods such as induction to an equal degree (42). But this

is consistent with the possibility that Xenophanes' adherence to the possibility of progress constituted progress itself, and that Popper's vindication of Xenophanes supplies a further example of progress, that is, in the history of ideas and in philosophy.

To revert now to the topic of progress in science, although Ruse is much less unsympathetic to there being progress in science than Hull, it is open to question whether his own version of evolutionary epistemology is fully consistent with belief in actual progress. His own version emphasises what he calls 'epigenetic rules' for all intellectual disciplines (43), fundamental rules such as the law of non-contradiction and ' $2 + 2 = 4$ ' (which supposedly take the form in human beings of innate dispositions), and maintains that their necessary truth is somehow grounded in their survival advantage. If they had lacked this advantage, it is held, then they would neither have been necessary truths, nor would have been believed as widely as they are by human beings. For their credibility is due to human evolution, rather than to factors that would have to be

recognised by any intelligent species, whatever its own evolutionary origins.

But this approach seems to cast into question whether the discoveries that are based on these rules can be held to represent progress, in view of the chance nature of their status and (supposed) origins. For the key criterion of acceptability within the various disciplines that embody or depend on these rules (logic and mathematics included) appears to be not truth but fitness for survival; hence such discoveries could make their holders fitter to survive without any advance towards the truth. (This is a version of a criticism that Ruse himself directs from time to time at Hull, but nevertheless it appears applicable to evolutionary epistemology not only of Hull's kind but of other kinds as well.) While there may be innate dispositions in human beings, the status of the fundamental principles of logic and mathematics can hardly turn on this kind of innateness. More generally, this kind of evolutionary epistemology appears (for the same reasons) barely compatible with belief in objective

scientific progress, and may help account for Ruse's reluctance to endorse absolute scientific progress as opposed to scientific progress of a context-relative kind.

If, however, we are prepared to credit the possibility (and sometimes the reality) of scientific advances (as Ruse seems inclined to do with regard to the work of Darwin and of Mendel), then the possibility of progress in the humanities, including the history of philosophy and even philosophy itself receives enhanced support. Why should not practitioners of humanities disciplines make advances in understanding culture, the arts, the past, or significant concepts, possibly through using improved techniques (as well as improved technology), or through taking into account the need for consistency between the answers to an increased range of questions? Even if there are gaps in the progress of a discipline for whole generations together, the possibility of such progress cannot be ruled out (44).

Needless to say, if progress is possible in philosophy and in the history of philosophy, it is also possible within the study of history and, by the same token, in social studies and in political science too. Both the humanities and the social sciences, like the natural sciences, embody the capacity for artificial selection, indeed for purposive selection, as opposed to natural selection (to which in Darwin's understanding they supplied the contrast that he needed to allow talk of 'natural selection' to make sense). In other words, human culture continues to have room for progress. And some progress involves directionality, or movement towards recognisable or agreed destinations. In the case of the humanities, the social sciences and the natural sciences, the agreed goal is improved understanding of the phenomena studied.

Nor, perhaps, can the possibility of social progress be excluded, although the criteria would be different ones. Ruse considers that few signs of progress are apparent in current society, but grants that there may have been 'times and places when

(absolute) societal progress seemed obvious' (45). The criteria of this past progress are not specified, but if what he has in mind includes the nineteenth-century abolition of slavery in Europe and America, then the criteria would relate to increased justice and liberty. Biologists diverge in their attitudes to social progress, with George Williams a pessimist (46) and E.O. Wilson an optimist (47); in each case a parallel view is adopted, whether pessimistic or optimistic, of progress in organic nature and in society as well. Wilson in particular believes that 'the same sociobiological forces govern the forward movement of society as have governed the upward rise of organisms' (48). Ruse considers that evolutionists with views such as these see progress in their science and proceed to read progress into both society and into organic nature. (49) Yet, through recognising past episodes of progress in society, he admits himself that such progress can and does happen. As for progress in organic nature, that is the topic of the coming section.

## 5. BACK TO EVOLUTION



So progress and, to some extent, directionality are genuine possibilities within culture, and in particular in the humanities and the sciences, and are acknowledged to characterise some tracts of history, even by sceptics. Let us now return to evolution, to consider whether the realm of natural selection is entirely different (as Ruse believes (50)), or whether, as some biologists believe, comparable.

Evidence for the possibility of progress and directionality in evolution could possibly be found in the evolutionary emergence of increasingly sophisticated organisms with increasingly sophisticated capacities. I have in mind not only human beings and their capacities for understanding and insight, but also organisms such as whales and dolphins, with their capacities for communication and collaboration. If there is intrinsic value in the development of the generic capacities of organisms, it may be possible to recognise greater and richer forms of intrinsic value in the emergence of capacities such as

these, and in the development of such capacities within the lives of individuals of the species concerned.

I am not suggesting that such developments are evidence for some form of unilinear directionality, with non-human organisms somewhere along a continuum and the capacities of human beings at its apex. Charles Darwin was firmly opposed to such a view, and for this reason avoided where possible even using the term ‘evolution’, to avoid being misunderstood as supportive of unilinear progressive development (51). Indeed natural selection can be seen as favouring adaptation to particular circumstances and ecological niches, as opposed to generic improvement. Nevertheless Darwin appears to have believed in progressive tendencies within evolutionary processes: thus in the third edition of the *Origin* he wrote as follows:

If we look at the differentiation and specialisation of the several organs of each being when adult (and this will include

the brain for intellectual purposes) as the best standard of highness of organisation, natural selection clearly leads towards highness; for all physiologists admit that the specialisation of organs, inasmuch as they perform in this state their functions better, is an advantage to each being; and hence the accumulation of variations tending towards specialisation is within the scope of natural selection (52).

Such an accumulation of adaptive variations, including the development of brains, comprised genuine progress, in Darwin's view.

Thus what we find is increasing sophistication, albeit in multiple directions. Simpler eyes evolve into more complex ones, supportive of more sophisticated kinds of evolutionary fitness. Correspondingly, the environment of the oceans supports forms of emergent sophistication such as those of whales and of dolphins, which are much better suited to survival, let alone flourishing in the oceans, than human beings are, or at least

were prior to their invention of ships. The environments of rivers, forests and mountains promote yet other diverse forms of sophistication. The sophistication of some human capacities seems well-adapted to savannahs, but it is only technology that has made other environments humanly habitable.

An appropriate way of regarding this pattern of diverse specialisation and sophistication is not a ladder or escalator, but the Darwinian model, cited with approval by Mary Midgley, of evolution seen as a bush with radiating branches (53). The branches radiate in different directions, some of which develop their own forms of culture, taught by one generation to another, such as the use of tools among monkeys, and collaborative hunting by whales. But cultural achievements arguably have an intrinsic value of their own, in addition to their value in terms of the survival of communities and of species. Organisms with culture make worlds of their own, and it is difficult not to recognise some form of directionality in their doing so, or at least in the achievements involved, such as successful

communication, even when the kind of directionality appears entirely different from that of the directionality that we may be prepared to recognise within human culture, for example in the sciences and the humanities.

Admittedly the kinds of directionality here do not involve progress towards goals agreed antecedently. On the other hand we can recognise directionality towards implicit goals such as survival, enhanced ways of coping with a given environment, and adaptability to a wider range of environments. Development towards these implicit goals is readily recognisable among species and organisms. So talk about progressive development in nature is not entirely inappropriate.

This interpretation is in line with that of Rolston, cited above. Rolston also discusses speciation as embodying a kind of progress in fecundity, with life on earth developing across three and a half billion years from a world of zero species to one containing as many as between five and ten millions (54). The

phenomenon of speciation and its history makes Darwin's model of a radiating bush (with its hint of multiple directionality) all the more appropriate. Those who uphold directionality in nature certainly need to be cautious of inadvertently promoting Social Darwinism, eugenics or racist ideologies. But upholding belief in multiple directionality, represented by the biodiversity of between five and ten million species, is hardly open to problems of any of these kinds.

The current interpretation can also be regarded as in line with the findings of the biologist Simon Conway Morris, who has written of life's convergence, in the course of evolution, on a relatively small number of recurrent successful patterns, chlorophyll, sentience and intelligence included, which Morris argues would evolve again if the tape of evolutionary history were to be re-run (55). Morris's conclusions are controversial, but his evidence of 'the ubiquity of convergence' is impressive, suggesting life's uncanny ability to find and develop a small range of solutions to the problems of often unpromising and

hostile environments (56). Indeed his own view is that these and other facts of evolution are congruent with the world being ‘a Creation’ (57).

Nevertheless, the kind of directionality intended here is barely comparable with the kinds discussed above in the sciences and the humanities, and thus hardly in line with the comparisons between nature and the sciences in point of progress drawn by E.O. Wilson and others. Yet both in nature and in culture these different kinds of directionality are readily interpreted as embodying and as generating states of affairs of positive value. Some reflections on this state of affairs are offered in the section that follows.

## 6. THEOLOGICAL INTERPRETATIONS

How we are to interpret these diverse kinds of directionality depends on intuitions, sometimes informed by separate experiences or patterns of reasoning. Readers interested in the interface of science, society and religion may be prepared to

consider the relation of these diverse kinds of directionality to the theistic hypothesis of there being a creator who creates in a manner supportive of intrinsic value, and possibly welcomes and facilitates value of this kind, that is value that there is reason for any agent to welcome, cherish, desire or promote.

Certainly the facts of evolution do not require us to adopt this hypothesis, let alone those of human history. Nor do the kinds of directionality that we find in the sciences and the humanities.

The facts of evolution, for example, are consistent with non-theistic interpretations such as unqualified materialism, even though it does not explain these facts, as opposed to telling us not to seek an explanation beyond nature.

However, there is quite a good fit between the kinds of possible directionality that we have come across and this hypothesis. For a creator desirous of a world of intrinsic value could well be responsible for both the worlds of nature and of culture, of evolution and of history. At least some of the phenomena are



what might be expected if this hypothesis were true, such as the emergence of creativity both in animal and in human cultures.

But there are problems. One of these is the extent of pain, suffering and premature death, states which are not states of value but of disvalue. Holmes Rolston has well discussed 'Disvalues in Nature' from a theistic perspective (58), but there is no space to delve into this matter here. Nor can I discuss here the parallel problem of disvalues in culture and in human history.

Another problem is the belated appearance of many forms of intrinsic value. Some might expect that a creator desirous of intrinsic value would bring it onto the stage sooner, if not from the outset. I will conclude with some remarks about this apparent problem, and then with discussion of a proposal about how progress in evolution might possibly be explained.

The problem of belatedness is a corollary of recognition of directionality, since directionality would not be needed if arrival at its destination or destinations had been put in place and realised earlier or all along. But the directionality of culture, including the arts and the sciences, can perhaps be reconciled with a theological interpretation along the lines implicitly put forward by Xenophanes. The gods, he suggests, did not disclose everything originally, so that human beings could gradually discover what was better (59), no doubt through exercising their curiosity, their cognitive capacities and their world-building potentials. What is attained in these ways, it could be argued, is more valuable than a world of much ampler knowledge and understanding arising from plenary briefings to humanity from the gods or other creative powers, for these are attainments resulting from the exercise of creaturely powers of reflection and evaluation of alternative solutions, and such exercise has value in itself. If so, the directionality of culture is just what might be expected.

To some slight extent, the same applies to the course of human history, as the history of the arts and the sciences are an important component of this history. We should, I suggest, with Popper, reject laws of progress, but that does not commit us to rejecting all traces of historical progress. However, the record is extremely patchy and diverse, and cannot here be further appraised.

For it remains to consider the related problem about directionality relevant to evolution, and to the 'Darwinian bush' kind of multiple directionality apparent there. Would not a creator desirous of intrinsic value introduce a swifter process than that of evolution, if the goal was the manifestation of the various kinds of directionality and of the achievements that sometimes accompany them (the flowering of the bush, as it might be said (so as to preserve the metaphor)? But here a parallel reply becomes at least a possibility. Perhaps the creator wanted the achievements of dolphins, whales, gorillas and human beings to come about as a result of the trial and error

processes characteristic of evolution. Popper himself regarded these processes as primitive counterparts of the conscious procedures of science itself; and, despite their dissimilarities (much remarked by Ruse) their characteristic of proceeding by trial and error can be seen as a common characteristic.

But we do not need to go all the way with Popper in this matter to take seriously the thoughts that the creative exertions of earlier creatures made possible those of later and more sophisticated ones, and that, rather than organisms being created with these capacities already in place and honed for practices like science, it could have appeared better that such capacities should themselves evolve over long tracts of time. That way, the process of evolution contrived to support greater biodiversity and possibly, all ages considered, as much value, if not greater.

Before we turn to conclusions, it is worth considering the recent suggestion of Robert John Russell about the way in which God may guide the course of evolution. Granted that evolution

depends both on natural selection and on genetic mutations between which this selection is made, the core of Russell's suggestion is that God may guide evolution through actions affecting such mutations (60). Expressed like this, his proposal may appear to involve intervention with the operation of laws of nature, or even to involve 'a God of the gaps'. So, whether or not we endorse Russell's stance, it is important to explain that, at least overtly, these are mistaken appearances.

As a believer in creation, Russell accepts that God, as creator, is responsible for the laws of nature, and maintains them without intervening in their operation. But at the same time the created universe is so constructed that God can act without 'intervening in the flow of natural processes' (61). One of the levels of such action is that of quantum mechanics, which is integrally involved in genetic mutations (62), and reflects ontological indeterminism in nature (63), given a realist interpretation of the Heisenberg/Schrödinger Indeterminacy Principle. Divine action at this level does not involve generating 'gaps' as sites for

changing the causal sequence of events, but was embodied in the overall plan of creation, while remaining invisible except to the eye of faith. Providential action, mediated through quantum processes (64), can make a difference to mutations, such as those related to the molecular bonds of DNA (65), and thus affect the phenotypic expression of such mutations (66).

Accordingly Russell's proposal, for non-interventional but objective divine action, avoids at least the more obvious kinds of objections liable to be directed at it, and at the same time serves to show one way in which God may possibly guide or steer evolution, thus potentially underpinning directionality, whether in the direction of diversity, of consciousness, or of both.

Russell's ingenious proposal could thus be seen as lending support to belief in divine purposes being progressively fulfilled in the course of evolution. However, it would not explain the 'step us, lock up' phenomenon remarked by Rolston, since that involves the continuing survival of initially selected mutations,

and not their generation. Further, Russell's commitment to a plurality of acts of special providence spread out across the history of life (67) continues to be reminiscent of a 'God of the gaps' approach, not least because each of them is held to change the antecedent course of evolutionary history, although this problem might perhaps be averted if this divine action were instead regarded as an aspect of the general providence implicit in creation itself. In any case, adherents of belief in the out-working of divine purposes across evolution have no need to appeal to this possibility, but could, as Morris does, appeal instead to aspects of the overall creative plan, such as the limited range of solutions to life-problems and the ability of evolving life to converge upon them. Belief in providence, then, need not turn on acceptance of Russell's proposal.

## 7. CONCLUSIONS

Ruse concluded that there is a much stronger case for belief in progress (albeit relative progress) in science than in history and society, and that the case for progress in organic nature was

slender in the extreme, since adaptation turns on genetic mutations, which are random and lack intentionality (68). At the same time, he was more convinced that within science there are attempts to move closer to the truth (because of the intentionality of scientists) than that non-relative or absolute progress is made (69). He also rejected the views of biologists who have accepted progress in science and in nature too on the basis that the same sociobiological processes are present in both realms (70), stressing again that the intentionality of science (and generally of culture) marks it off from the natural realm. At times, though, he represented these findings from his comparisons as largely matters of taste (71).

In this essay I have adopted a more robust view of (non-relative) progress in science and the humanities, grounded not only in the intentionality of the participants, but also in their rationality and rational collaboration; and this is an interpretation that coincides with widespread contemporary intuitions. Such progress is neither inevitable nor necessarily continuous, but accepting it



is more than a matter of taste, for these are realms where progress (involving a better understanding of relevant phenomena) is widely recognised as a matter of fact. I have found myself in agreement with Ruse that the grounds for belief in progress in the distinct realms of science, society and nature are different, and that radical forms of evolutionary epistemology that assimilate selection in science to selection in nature are to be rejected. But I have also raised questions about Ruse's own more moderate version of evolutionary epistemology, for other reasons.

Yet I have concluded that progress is achievable and directionality is observable within both the sciences and the humanities, and that they sometimes figure, albeit with a less predictable frequency, within history and society. With regard to organic nature, my conclusions are, following Rolston, that the history of speciation has brought salutary advances in point of biodiversity, and that the growth of variety, complexity and sophistication among organisms (for which Darwin's radiating

tree is an appropriate model) embodies multiple directionality, even though such evolutionary progress takes place as a result of unintended mutations and adaptations. Nature does not display the kind of directionality that science does, because of the lack of intentionality on the part of most of the organisms involved; but unintentional yet valuable directionality and progress can still be discerned.

I have also argued that there is a consilience between the emergence of value in nature, science and society as thus understood, and their creation by a value-loving creator. These theological intuitions do not follow from the nature of organic nature, science or society; but they can still illuminate what we encounter when we contemplate these phenomena.

## NOTES

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2. Ruse, *ibid.*, 113.

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4. Karl Popper, *The Open Society and Its Enemies* (London:

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5. See Karl Popper, *The Poverty of Historicism* (London:

Routledge & Kegan Paul, 1957) and *The Open Universe: An*

*Argument for Indeterminism* (London: Hutchinson, 1982); for

his refutation of historicism, see *The Open Universe*, 62-64.

6. *The Open Society*, Vol. II, 322 (note 13).

7. *Poverty of Historicism*, 154-157.

8. Karl Popper, 'The Unknown Xenophanes', in Popper, *The*

*World of Parmenides: Essays on the Presocratic Enlightenment*,

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9. Karl Popper, *Conjectures and Refutations: The Growth of Scientific Knowledge* (London: Routledge & Kegan Paul, 1963)

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10. Herbert Butterfield, *The Whig Interpretation of History*,

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11. Butterfield, *Christianity and History* (London: Bell, 1949).

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(Chicago and London: University of Chicago Press, 1988), 57-

72.

14. Michael Ruse, “Scientific Change is a Family Affair”, in

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New York: Routledge, 1995), 138-153, at p. 148.

15. Ruse, *ibid.*, 149.

16. Michael Ruse, “A Threefold Parallelism For Our Time: Progressive Development in Society, Science and the Organic World”, in Ruse, *Evolutionary Naturalism*, 112-137.
17. Holmes Rolston III, *Environmental Ethics: Duties to and Values in the Natural World* (Philadelphia: Temple University Press, 1988), 21-22.
18. Stephen Toulmin, “The Evolutionary Development of Science”, *American Scientist*, 57 (1967), 456-71; Toulmin, *Human Understanding* (Oxford: Clarendon Press, 1972).
19. Toulmin, ‘The Evolutionary Development of Science’, 465.
20. Toulmin, *ibid.*, 170.
21. Karl Popper, *Objective Knowledge* (Oxford: Oxford University Press, 1972).
22. David Hull, “A Mechanism and Its Metaphysics: An Evolutionary Account of the Social and Conceptual Development of Science”, *Biology and Philosophy* 3, 1988, 123-155, at p. 126.
23. Hull, *ibid.*, 127.

24. Hull, *ibid.*, 134.
25. Hull, *ibid.*, 139.
26. Hull, *ibid.*, 146.
27. Michael Ruse, *Evolutionary Naturalism: Selected Essays* (London and New York: Routledge, 1995), 178.
28. Ruse, *ibid.*, 179.
29. Ruse, *ibid.*, 178-9.
30. Hull, *op. cit.*, 144.
31. Robin Attfield, "Cultural Evolution, Sperber, Memes and Religion", *Philosophical Inquiry*, 35, 3-4 (Summer-Fall 2011), 36-55; ISSN, 1105-235X.
32. Ruse, *op. cit.*, 179.
33. Ruse, *ibid.*, 179-80.
34. Hull's passage is in fact from 'A Mechanism and Its Metaphysics', 146-7. Ruse quotes this passage at *ibid.*, 180-1, but wrongly ascribes it (unless it was published twice in the same year) to pp. 40-42. His comments are on p. 181.
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36. For a defence of generic realism, see Robin Attfield, *Creation, Evolution and Meaning* (Aldershot, UK and Burlington, VT: Ashgate, 2006), ch. 2.
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38. Karl Popper, “The Unknown Xenophanes”, in Popper, *The World of Parmenides: Essays on the Presocratic Enlightenment* (London and New York: Routledge, 1998), 33-67, at pp. 36-38
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40. Popper, *ibid.*, 48-49.
41. Popper, *ibid.*, 49-50; Popper, *Conjectures and Refutations: The Growth of Scientific Knowledge* (London: Routledge & Kegan Paul, 1963), pp. 187-188.
42. Robin Attfield, “Popper and Xenophanes”, *Philosophy*, 89, (2014), 113-133.
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Charles Darwin, *The Origin of Species*, first edition (London: John Murray, 1859), chapter IV.

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55. Simon Conway Morris, *Life's Solution: Inevitable Humans in a Lonely Universe* (Cambridge, UK: Cambridge University Press, 2003); see pp. 106-196.

56. Morris, *ibid.*, pp. 107 and 329.

57. Morris, *ibid.*, p. 329

58. Rolston, "Disvalues in Nature", *The Monist*, 75 (1992), 250-278. I have discussed this problem in Attfield, *Creation, Evolution and Meaning*, chs. 6 and 7.

59. Xenophanes, fragment B18: see Popper, *The World of Parmenides*, p. 48 .

60. See Robert John Russell, *Cosmology From Alpha to Omega:*

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(Minneapolis: Fortress Press, 2008), p. 216.

61. Russell, *ibid.*, p. 19; see also p. 212.

62. Russell, *ibid.*, p. 19.

63. Russell, *ibid.*, p. 120.

64. Russell, *ibid.*, p. 153.

65. Russell, *ibid.*, pp. 165-6.

66. Russell, *ibid.*, p. 182.

67. Russell, *ibid.*, pp. 121, 153, 181-4.

68. Ruse, *Evolutionary Naturalism*, 136, 140, 178-182.

69. Ruse, *ibid.*, 133.

70. Ruse, *ibid.*, 132-133.

71. Ruse, *ibid.*, 128, 182.

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