

# **‘God, Providence and the Evolutionary Phenomenon of Cooperation’**

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*Introduction: How A Game Theoretical Account of Evolutionary ‘Cooperation’ Makes a Difference to Classic Darwinism*

In this paper I want to propose a theological reflection on divine providence and its relation to neo-Darwinian theory, but with a particular focus: that of the evolutionary phenomenon of ‘cooperation’, and its most recent theoretization in terms of a game theoretical calculus. The ambition to give evolutionary dynamics the precision of a *mathematical* explanation might seem, at first blush, to be a potentially reductive and even deterministic move, positively inimical to any theological meaning system that might be held in tandem with it. But in fact it will be argued here that a proper understanding of the significance of the evolution of ‘cooperation’, when mathematically understood, does not imply any such reduction. Indeed it may actually help us to clarify the sense in which evolutionary theory of this sort remains stochastic in status, whilst simultaneously attaining greater statistical precision; the matter of metaphysical explanation at a deeper *causal* level (such as Thomas Aquinas meant by ‘primary causation’) thus remains wide open to theological speculation. Moreover, such developments in understanding about ‘cooperation’ act as a positive check and balance, first, to a merely atavistically *competitive* vision of evolutionary processes; and may even suggest to us, finally, I shall argue, how to think more creatively than we usually do about the intrinsic relation of the Christian doctrines of incarnation and Trinity to that of divine providence.

In what follows I shall first give an introductory account of what game theorists mean by ‘cooperation’, and what difference such an understanding has made to classic Darwinism in the last few decades. In the main, second, part of my paper I shall then move to chart some of the potential theological implications, as I see them, of this new mathematical understanding of evolutionary dynamics for a contemporary doctrine of providence, even though in the compass of this short lecture I can only operate with fairly broad brush strokes. My argument, to anticipate, will be that classic Thomism fares particularly well as an accompaniment to evolutionary dynamics, so understood; but that it fares even better if we superimpose the template of the doctrine of the incarnation from the last part of Aquinas’s *Summa Theologiae* (*ST* IIIa) already onto the basic assumptions of the first part (*ST* Ia), from the outset. Reading the *Summa* backwards may turn out, in other words, more richly creative for reflection on the contemporary science/religion debates than is most commonly assumed. *Disposing* of doctrinal ‘complications’ such as incarnation and Trinity (while discussing basic issues such as God’s relation to the world, or arguments for God’s existence), may in contrast mask a covert deism and paradoxically turn out to be a strategy that creates more problems than it solves in the science/religion debates.

But first, a rather introductory, and necessarily condensed, account of the evolutionary phenomenon of ‘cooperation’ and its significance for current neo-Darwinian theory. (In this section I draw heavily on the recent work of my Harvard colleague and collaborator in a current research project, Martin A. Nowak.)

We probably do not need to be reminded, first, that evolution is based on *competition* between both individuals and species in populations. *Prima facie* this competition would appear to promote only selfish and self-interested behaviours, and indeed in a well-mixed population such behaviours do indeed win out in normal circumstances, at least for a while. Replication, mutation and selection are the basic principles of evolution so brilliantly highlighted by Darwin, and together they provide a convincing account (‘explanation’ may be too strong a word: we shall return to that) of how species change and evolve, and how weaker forms of life are weeded out in favour of stronger. But there is another phenomenon in evolution, so-called ‘cooperation’, without which the dynamics of life would not, as it turns out, go on as they do. Darwin, with extraordinary prescience, already hinted in *The Descent of Man* at the importance of tribal solidarity, for instance, for ongoing evolutionary development; but he could give no precise explanation at the time of its significance in relation to his primary principles of mutation and selection.

It is only the advances in the mathematical understanding of evolutionary dynamics which have come about since the 1970s which have allowed an account to be given of how ‘cooperation’ in populations decisively affects evolution in distinctive ways. It is often observed that replicating individuals in the evolutionary spectrum at times ‘cooperate’ with one another - in a particular sense of the word which we must now clarify. ‘Cooperation’ in this context has a precise meaning that can be expressed mathematically in a game theoretical calculus such as the Prisoner’s Dilemma: it does not just mean ‘working together’ of any sort, as in ordinary language use, but a particular form of working together in which, in conditions of social dilemma, one individual loses out in terms of fitness (whether genetic or cultural) and another thereby gains. In the classic Prisoner’s Dilemma game, of course, the choice of ‘cooperation’ over ‘defection’ can result in more than one outcome: either I lose out *very* badly, because you ‘defect’; or you ‘cooperate’ as well and we both do somewhat better than if we had both ‘defected’. However, in both cases ‘cooperation’ brings the *risk* of my doing very badly indeed; and *prima facie*, therefore, one might think that it must be a losing evolutionary strategy over the long haul. Yet such ‘cooperative’ events are commonly observed in evolution as stable strategies, right from the level of bacteria to that of human behaviours. For instance, bacteria form colonies in which some cells give up the possibility of reproduction in order to feed others. Similarly, in multi-cellular organisms only a few cells reproduce (the germ line), while most cells are just there to ‘feed’ the germ line. Cancer, interestingly, can be explained as a breakdown of such a cooperation between cells (which in contrast suddenly do the opposite: they ‘defect’); mutated cells revert to their primitive programme of ‘selfish’ replication at the expense of other cells, ultimately causing the death of the organism. Social insects, as is well known, are masters of cooperation; but - as Martin Nowak puts it - the ‘undisputed world champions of cooperation’ are we humans. Our forms of costly ‘cooperation’ range from the

undertakings of parenting in small family units to the current grand possibility - which would involve an unprecedentedly world-wide scale of 'cooperation' - of saving the planet from ecological disaster.

It should be noted, however, that the evolutionary phenomenon of 'cooperation', leanly defined as I have suggested, is essentially *pre-moral*; we should not make the mistake of presuming that 'cooperative' behaviours are intrinsically good (a sort of 'warm fuzzy' complement to the 'selfish gene' hypothesis), and 'defecting' ones bad; since it is only when we reach the arena of human, linguistic, so-called 'cultural' evolution that we can begin to have the meta-ethical discussion about what *constitutes* the good towards which we might aim in 'cooperation', and whether it is perceived (amidst a variety of meta-ethical options) in utilitarian, deontological or virtue terms (or some combination) - let alone how it might relate to a (possibly existent) God. Note that it is in principle possible, then, to 'cooperate' in an evolutionarily costly way, precisely as defined above, yet for sadistic or murderous ends which would be judged *immoral* on most or any meta-ethical principles; the evolutionary existence of 'cooperation' does not as such, then, bespeak any naïve evolutionary meliorism such as proved tempting to an earlier generation of post-Darwinian American theologians of the late 19th century, who seized with delight on Comte's newly designated phenomenon of 'altruism'.<sup>1</sup> That was, of course, all before the First World War and the rise of the Third Reich: now, we might say, we know better.

Thus we need to distinguish, I suggest, between 'cooperation' in its mathematically clarified evolutionary sense, and 'altruism' as an additional *motivational* state which may nest into such 'cooperation' and add the explicit intentionality of self-sacrifice for a particular *good*. In practice, however, a huge and ongoing muddle is caused in debates between evolutionary biologists and philosophers of science (of various stripes) when the word 'altruism' is used to cover, and smudge together, both what I've here called 'cooperation' and what I've called 'altruism' (on this see the revealing recent article by Peter Godfrey Smith and others on the ambiguity of the term 'altruism'). Elliott Sober and David Sloan Wilson, I should note, in their justly celebrated *Unto Others* (1998), make a similar distinction as mine, but call the first 'evolutionary altruism' and the second 'psychological altruism'; but much of the biological literature and popular scientific journalism fails to make this distinction at all, with gravely misleading ethical consequences and resultant philosophical confusion. It is morally vital, as I have indicated, that we distinguish these two categories, even though it is hard to say with precision when the capacity for the latter ('altruism') starts to emerge from the former ('cooperation') in the evolutionary scale. The higher apes, elephants, and dolphins, for instance, appear to exhibit some behaviours that suggest empathetic understanding and even sacrificial *choices*; but it remains philosophically question-begging and speculative, of course, to attribute actual 'altruistic' intentionality to them in a pre-linguistic context.

I have myself become so frustrated by attempts at precise definition in this area being smudged and distorted by overtones – affective or emotive – being imported from

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<sup>1</sup> On these historical developments, see Thomas Dixon's revealing new book.

ordinary language use, that I'm on the point of suggesting that we simply coin neologisms for these two phenomena, evolutionarily conceived: why not call 'cooperation' 'blip', and 'altruism' 'blop'? Let's see if I can keep that up for the rest of this lecture. It may help us to avoid physicalist reductionism on the one hand, and emotive optimism on the other.

Martin Nowak has recently provided a succinct mathematical résumé of *five* rules for the successful evolution and maintenance of 'cooperation' (my 'blip'), in an article in *Science* that surveys over 30 years of research in evolutionary biology;<sup>2</sup> and he provides there, and in accompanying materials on the web, the more precise mathematical formulations of what I shall now only briefly relay in words. J. B. S. Haldane was the first to identify the phenomenon of 'kin selection' (or 'inclusive fitness'), first, whereby evolution could be shown to *favour* cooperation if the donor and the recipient of costly acts were genetic relatives and so passed on the tendency. It was Hamilton who formalized this first cooperative mechanism and it came to be called 'Hamilton's rule'. Trivers added to this, secondly, the notion of 'direct reciprocity', to show that even unrelated individuals or species could in some circumstances develop and maintain 'cooperative' practices: if one cooperated now, the other might later, and hence overall it might turn out to pay off to cooperate long-term on account of the mutual benefit. (This second game-theoretic framework is known as the repeated Prisoner's Dilemma.) The third principle of cooperation is termed 'Indirect Reciprocity' and relies heavily on what evolutionary biologists call 'reputation'. One cooperates with another whom he may never meet again, but the behaviour is observed by *others* and eventually rewarded: natural selection turns out to favour strategies that base the decision to cooperate on the reputation of the recipient. A fourth circumstance in which cooperation wins out occurs in so-called 'network reciprocity', in which defection does not naturally dominate as in well-mixed populations, because cooperators here form *clusters* which protect and enhance the success of their cooperation. It turns out that one can graph such clusterings of cooperation, and that a surprisingly simple rule determines whether 'network reciprocity' will *favour* cooperation: the benefit-to-cost ratio in fitness terms must exceed the average number of neighbours per individual. Fifthly, and lastly, there is the controversial 'group selection' *tout court*, where a population is divided from the start into groups and in some cases groups of cooperators fare better than groups of defectors. The reasons for this continue to be debated, and much depends on how one models 'group selection' mathematically. However, in a competition between cooperator groups and defector groups, pure cooperator groups can be shown to grow faster than pure defector groups, even though – in a standard well-mixed population – defectors will still win out (this was the phenomenon already mused upon by Darwin).

What conjoins all five of these *different* evolutionary mechanisms, concludes Nowak, is a payoff matrix in which 'cooperation' can be shown to be favoured over defection in particular circumstances. And what is particularly fascinating about this discovery is that it explains the paradoxical fact that – whereas defectors always win out initially in a well mixed population - they do so *at the cost of* declining average fitness: one might say that extreme competitiveness de-thrones itself. 'Cooperation' (blip), then,

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<sup>2</sup> This article was circulated at the lecture and is also available on Nowak's Harvard website.

in its various forms, is the mysterious key to the *regeneration* of fitness; without it, in fact, there would not be constructive developments in evolution which lead to new levels of organization: genomes, cells, multi-cellular organisms, social insects, human societies. Thus we may even be led to say - a little counterintuitively, to be sure, given classic Darwinism - that down the road evolution ultimately *favours* sacrificial, forgiving, and non-punitive behaviours. As a result of the mathematical clarification of these cooperative mechanisms Nowak has recently gone so far as to describe cooperation (blip) as a 'third principle' of evolution, alongside mutation and selection, although he is well aware of the relative lack of awareness in the general scientific community, let alone the lay public, of this finding.

A final point in this lengthy Introduction is worth making as a bridge to our specifically theological reflection on evolution and providence based on the foregoing analysis. Fears are regularly expressed by believing Christians that neo-Darwinian theory promotes either reductive physical determinism, on the one hand, or else – this is a rather paradoxical combination – a frighteningly erratic ontological *randomness*. Both of these features would seem, *prima facie*, inimical to a belief in any providential divine guidance of the evolutionary process. However, it should be stressed that the game theoretical explication of the principles of evolutionary dynamics is of a stochastic sort: it enlightens us about statistical regularities in the processes of evolution, regularities that should precisely soothe fears about totally *erratic* 'randomness' (whatever that is); but at the same time it does not, on closer reflection, provide any *ontology* at all, whether deterministic or otherwise. That is, 'evolution' is, on Nowak's understanding, neither a metaphysical principle, nor even a complete 'explanation' of biology. Rather we might describe evolution from this perspective as a complex form of sorting, or search, process. It leaves completely unanswered the deeper metaphysical questions about causality, whether created or divine. And to these issues we must now turn in the second main half of our paper.

## II: *A Thought Experiment to Link Classical Christian Theism (in the Thomistic Tradition) and Evolutionary 'Cooperation'*

I have taken this amount of time in providing an introduction to game-theoretical accounts of evolutionary 'cooperation' (blip), because I find in contemporary popular discussions of evolution and religion that these features of recent evolutionary theory are rarely discussed, or if they are, are often quite misleadingly represented.

Our key question now, as we turn to the more important systematic/theological part of the paper is this: how, if at all, might this game theoretical understanding of 'cooperation' (blip) affect, colour or even change a *theological* account of the relation of divine providence and evolutionary development?

Let me divide what I want to say here into two main parts, with a hinge passage between them which will explain why I see most (popularly known) *current* options in response to the problem of evolution and divine providence as inherently unsatisfactory. In the first part (section A), I shall examine what I see as the *three* most profound

problems for Christian theism, and especially for its doctrine of providence, since the advent of Darwinism, so profound as to cause many to see Darwinism as a ‘defeater’ of Christian belief. These problems were certainly not absent before the discovery of evolution; indeed they are classic inheritances from Christian philosophical theology and apologetics which have exercised Christian thinkers from at least the third century, if not before. But evolutionary theory has certainly sharpened these issues in particular ways that – I would insist – responsible contemporary Christians cannot now avoid confronting. In my second section (section B), I shall highlight the *particular* insights and nuances that a theological approach informed by the recent evolutionary theory I’ve just described can bring to the solution of these questions. In short, I want to suggest not only that we can effect a convincing response to the problems in section A, but that, in addition, we can provide a distinctive and novel theological approach resulting specifically from our new understandings of the significance of ‘cooperation’ (blip) as an evolutionary phenomenon.

A. *Three fundamental problems in the relation between the created realm and divine providence, given evolutionary theory*

In this paper I am assuming a ‘classical’ understanding of the Christian God, that is, a God who is Being itself, creator and sustainer of all that is, eternal (i.e., a-temporal, omnipresent), omniscient, omnipotent, all-loving, indeed the source of all perfection. One solution to the problems we confront in this section is to give up on one, or more, of these classical attributes for God (and that has been a particularly popular route in science and religion discussions in recent decades). But for the meantime I shall not entertain that systematic option – since I suspect it results from a failure to think through the full logical implications of divine atemporality - even though it cannot, *a priori*, be ruled out. One of the deficiencies in many previous accounts of the problems addressed in this section, however, has been artificially to extrapolate the debates in science and religion from the trinitarian and incarnational dimensions of this classical Christian theism, i.e., *covertly* to assume that it is deism, rather than Christian theism, that is a stake in the attempt to construe the relation between ‘God’ and the created process. In what follows I shall attempt to avoid this mistake, anticipating some of the themes that the consideration of ‘cooperation’ (blip) will also bring to bear in section B.

What then are the three problems, already mentioned, that confront us when we try to see a coherent relation between a good, providential deity, and the unfolding created process? First, there is the issue of how we should understand the relation of God’s providence to pre-human dimensions of creation and their development. Second, there is the issue of how God’s providence can relate to the specific arena of human freedom and creativity. Then third, there is the problem of evil, the question of why what happens in the first two realms manifests so much destructiveness, suffering and outright evil, if God is indeed omnipotent, omniscient and omnibenevolent.

Why does modern evolutionary theory *intensify* these problems? They were, after all, already confronted and tackled with considerable sophistication in classical Greek philosophy and in early Christian thought, and refined further in the much-ramified

discussions of high scholastic medieval theology. But modern Darwinian evolutionary theory *appears*: (a) to underscore the ‘contingency’ or ‘randomness’ of evolutionary ‘mutation’ and ‘selection’, and thus to render newly-problematic the possibility of a coherent divine guidance of pre-cultural evolution; (b) to bring further into question the compatibility of divine providence with the human ‘freedom’ of the ‘cultural evolution’ stage, given the deterministic and reductive assumptions of much evolutionary theory - bolstered more recently by genetic accompaniments to the original Darwinian vision. (‘Freedom’ now seems to look like little more than an ‘elbow room’ within a physically predetermined nexus (so Daniel Dennett); yet - paradoxically - one represented in much modern thought as straining towards an *autonomous* ‘will to power’ that would precisely compete with, and cancel, an undergirding divine impetus); and thus (c) modern evolutionary theory appears to intensify thereby the problem of evil intolerably. If God is, after all, the author and ‘sustainer’ of the destructive mess and detritus of both pre-cultural and cultural evolutionary processes, why is s/he so incompetent and/or sadistic as not to prevent such tragic accompaniments to her master-plan? If intervention is an option for God, why has s/he not exercised it?

A complete and detailed answer to these conundrums cannot be essayed in this one lecture; but some broad strokes and intuitions will help lead the way through to a preliminary solution which I lay before you. In the case of each problem there is a common contemporary *misapprehension* to be avoided, on the one hand, and some important enrichment and colouring from the Christian doctrines of Trinity and Incarnation, on the other hand, to add crucially to our reflection.

1. First, then, it is vital to avoid, in the case of pre-cultural evolution, the presumption that ‘God’ *competes* with the evolutionary process as a (very big) bit player in the temporal unfolding of ‘natural selection’. No self-respecting Thomist would of course be even tempted in such a direction; but once we are released from that false presumption, ‘God’ is no longer – and idolatrously – construed as problematically interventionist (or feebly failing in such) along the same temporal plane as the process itself. Rather, God is that-without-which-there-would-be-no-evolution-at-all; God is the a-temporal undergirder and sustainer of the whole process of apparent contingency or ‘randomness’, yet – we can say in the spirit of Augustine and Aquinas - simultaneously closer to its inner workings than it is to itself. And as such, God, we might say, is – in a unique way - *both* intimately ‘within’ the process, *and* ‘without’ it. To put this in more richly trinitarian terms, inspired by Romans ch. 8: God, the Holy Spirit, is the perpetual invitation and lure of the creation to return to its source in the ‘Father’, yet never without the full – and suffering - implications of incarnate ‘Sonship’ (implications which affect the whole cosmos). Now once we see the possibility of understanding the contingency of pre-cultural evolution in this way, we need not – as so much science and religion ‘dialogue’ has done in recent years – declare the evolutionary process as necessarily ‘deistically’ *distanced* in some sense from God to accommodate its ‘randomness’ (see, e.g., John Polkinghorne, *Science and Providence*, p. 45: God *gets out of the way* so that evolution can happen contingently, and Polkinghorne unfortunately calls *this* phenomenon, ‘kenosis’). Rather, let me propose in contrast that God is ‘kenotically’ infused (not by divine loss or withdrawal, but by effusive pouring out) into every causal

joint of the creative process, yet precisely without overt derangement of apparent ‘randomness’. How can this be, metaphysically? First, it can be so because God’s providential impinging on the evolutionary process, on this view, is not a miraculous or external *additum*, but the undergirding secret of the maintenance of the created order in being: it is ‘primary causation’ in Aquinas’s terms. And secondly, it can be so because we now know with ever greater precision, given the aid of the mathematical calculus of game theory, that evolutionary processes do occur within certain particular patterns of development. Even epistemically, then, we can chart processes of remarkable evolutionary regularity; and ontologically, there seems no *irrationality* in positing the existence of a transcendent (and also immanent) divine providence, albeit one that kenotically – in my sense – ‘self-hides’ in the appropriate spirit of divine incarnation.

But how, the sceptic might object, is evolutionary contingency, and (in a minute when we get to it) genuine human freedom, to be seen as logically compatible with this secret divine guidance? The intuition pump I want to propose here is what Peter Geach once called the ‘chessmaster model’ (even though the analogy as presented by Geach was notoriously imprecise and still affected by anthropomorphism). The basic idea, however, is this: God is (somewhat, but only somewhat!) like a chessmaster playing an 8-year-old chess novice. There is a game with regularities and rules; and although there are a huge number of different moves that the child can make, each of these can be successfully responded to by the chessmaster – they are all already familiar to him. And we have no overall doubt that he is going to win. The analogy with God and the evolutionary process, or with human freedom, admittedly involves some stretching: for a start, God has created the whole game. Also God timelessly knows what will happen on any different scenario depending on what moves occur (at least if we buy Molinist ‘middle knowledge’ as a philosophical option, a position that admittedly needs defence and further explication). But there is a crucial difference here between God *knowing* what will occur and God directly *causing* what occurs;<sup>3</sup> for on this model the contingent variables and choices occur at the level of secondary causation (albeit undergirdingly sustained and thus primarily caused by God).

2. So now let’s apply this same model to the problem of divine providence and human cultural evolution, including the evolution of genuine (‘indeterministic’) freedom.<sup>4</sup> The modernistic danger here is a slightly different – but closely related – one from the danger that we saw in the first problem (that is, the danger of assuming that God is a mere item, albeit ‘big’, in the temporal universe itself). For the problem here, secondly, is to think falsely of God as making human *autonomy* competitively constrained by divine action, rather than thinking of true human freedom as precisely right *submission* to the graced will and action of God. In other words, once again we must think not deistically but trinitarianly and incarnationally of God. We can find Christ’s agony in the garden, or his submission to divine will on the cross, as the hallmark and pattern of achieved human freedom rather than its supersession. Once we see human freedom, in its truest and best sense, as freedom-for-God, rather than freedom-

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<sup>3</sup> Here see the fine account of this point in Aquinas by Harm Gorris.

<sup>4</sup> Eleonore Stump provides one exacting, albeit controversial, account of how Thomas’s position on freedom may be construed.

against-God, then much of the force of the second problem falls away. Not that suffering and sin do not remain in the evolutionary story – and that in apparently gross and unjustifiable quantities. And that brings us immediately to our third problem.

3. And here, once more, there is an equally-seductive modern misapprehension to avert. And that is the presumption that dying, or indeed evolutionary ‘extinction’, is the worst thing that can happen to anyone (or thing). But that, again, I would contest. This point is *not* to be misheard, note, as a seeming justification for avoidable suffering, victimization, or abuse, let alone for a carelessness about the dangers of evolutionary extinctions and ecological imbalance; but it is to be heard *christologically*, as an insistence that the deepest agony, loss, and apparent wastefulness in God’s creation may, from the perspective of atemporal divinity (and yet also *in the Son’s* agony and ‘wasted’ death), be spanned by the Spirit’s announcement of resurrection hope. Evil, from this perspective, is mere absence of good; death is the prelude to resurrection. To be sure, the apparent risk God takes in human ‘freedom’ is the terrible risk that humans announce their false ‘autonomy’ in cruelty and destructiveness; yet this so-called risk is the one out of which the worthiest, and – again - most deeply incarnational, forms of participation in God can arise. To underscore my profound difference here from some of the forms of late 19th century optimistic ‘meliorism’ that flourished in liberal theologies that seized incautiously on the recently-discovered evolutionary phenomenon of ‘altruism’: cooperation (blip), as an evolutionary development, implies - as we saw - no facile moral optimism. Cooperation (blip) can ultimately lead, in its transformed human state (blop), to very great good *or* to very great evil (depending on one’s meta-ethical account of the ‘good’): fascist groups for instance can, in principle, be well-trained - even fine - cooperators. The lesson seems to be this: the higher up the evolutionary scale we go, the greater propensity for ‘cooperative’ good, *and* the greater propensity for ‘cooperative’ evil.<sup>5</sup> ‘Blip’, when it is attended by the human additum of ‘blop’, can lead to saintly manifestations of self-sacrifice, to be sure; but there is no guarantee that such will follow.

To sum up my argument so far: it is not that God has *not* ‘intervened’ in the history of the evolutionary process to put right the ills of ‘randomness’ and ‘freedom’; for in one sense God is ‘intervening’ constantly - if by that we mean that God is perpetually sustaining us, loving us into existence, pouring God’s self into every secret crack and joint of the created process, and inviting the human will, in the lure of the Spirit, into an ever-deepening engagement with the implications of the Incarnation – its ‘groanings’ for the sake of redemption. God, in short, is *always* ‘intervening’; but only rarely do we see this when the veil becomes ‘thin’, and the alignment between divine, providential will, and evolutionary or human ‘cooperation’, momentarily becomes complete. Such, indeed, we might hypothesize, was Christ’s resurrection, which we call a ‘miracle’ because it seems, from a ‘natural’ and ‘scientific’ perspective, both unaccountable and random. Yet, from a robustly theological perspective, it might, I suggest, be *entirely* ‘natural’, the summation of the ‘cooperative’ capacity, indeed of the entire trinitarian evolutionary process, and thus its secret key.

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<sup>5</sup> ‘Cooperation’ could I believe be appealed to in a newly-developed argument for ‘higher order goods’ along these lines.

*Transition: Unsatisfactory options in the current debates about evolution and divine providence*

These thoughts, now briefly enunciated, help us to see why the particular range of options currently popularized in the press in response to the evolution/God debates, seem curiously inept alternatives. Dogmatic ‘scientific’ atheism, first (no need to name names here!) constantly goes well beyond the empirical evidences of evolution itself, and can give no convincing account of its own pessimistic reductionism; it thus falls, in my view, on its own methodological sword. (A suitably ‘apophatic’ Christian doctrine of creation, as Michael Hanby has recently pointed out in important article in *Theology Today*, is ironically far less ‘ideological and thus – dare we say it- more *scientific*’ than this sort of reductive neo-Darwinism.) Intelligent Design (with a capital I and D), in inverse contrast, tends to assume a God who only occasionally bestirs himself to special action; even if this were not already unacceptable theistically, its ‘solutions’ prove deeply problematic and vulnerable scientifically as well. (This is not to say that there are not remaining areas of uncertainty, even nescience, in current evolutionary theory; nor is it to deny *a priori* – as we have stressed already – the possibility of ostensibly interventionist ‘miracles’. The issue is one of divine coherence and consistency.) The third option, however, which we may here call the ‘no contest’ position (as evidenced in much fine Roman Catholic theology emanating from the Vatican, as well as from scientific exponents not antagonistic to belief), also has its problems, about which we should not be coy. Since our own view most closely approximates to this third option (of the three ‘popularly’ discussed), it is worth clarifying what is deficient about a certain sort of ‘no-contest’ position (let us dub it the ‘lazy no-contest’ stance) before we pass into our final comments and attempt to indicate how these problems might be rectified by a particular attention to the evidences of ‘cooperation’ (blip).

*Lazy* ‘no-contesters’, I would suggest, threaten to undermine their own intellectual credibility in at least three, overlapping, ways. First, by hermetically sealing the boundaries between science and theology, they merely invite the (obvious) scientific response of Laplace that ‘I have no need of this hypothesis’. God, in other words, is so effaced from possible evidential discovery as to render her invisible, and thus fully *dispensable*, on ‘scientific’ grounds. Secondly, such a divide tends to reinforce an – admittedly often smudged – separation between church and state that in North America keeps religious commitment in a subjective realm of ‘preference’ rather than in a public realm of rational negotiation. Thirdly, and correlatively, the ‘lazy non-contestation’ view therefore implicitly encourages the presumption that religious belief is *irrational*, or ‘personal/affective’, rather than accountable and arguable (albeit within a realm that also embraces significant mystery).

In short, the ‘no-contest’ position is to be affirmed for its right insistence that God and the evolutionary process are not on the same ‘level’, whether temporally or in ‘substance’. But we now need to consider, in our final section, how the discovery of ‘natural cooperation’ - as what Martin Nowak calls the ‘third fundamental principle of evolution’ (alongside mutation and natural selection) - might modify, or nuance, the ‘no

contest' position. Only thus, I shall suggest, can one avoid the dangers and pitfalls we have just outlined, and to which the position is so often subject.

B. *How 'Cooperation' makes a Difference to Systematic Reflection on Providence:*

I shall confine myself to two basic points in this last section. The two points form a pincer-movement, in that they enunciate, both from a scientific and from a theological perspective, a necessarily *dialectical* pattern in the relationships between evolutionary and providential understandings of the world's processes, and one therefore that cannot leave the 'no-contest' position unaffected, or in its 'lazy' stand-off posture. It causes me to propose a model of science and theology as disciplines that mutually inspire, but chasten, each other, even as they remain on structurally different levels of operation.<sup>6</sup> In short, if my intuition is correct, then the 'cooperative' ('blip'-like) tendencies of evolution themselves *suggest* a 'natural' *praeparatio* in the processes of 'selection' for the potential later heights of proper 'altruism' ('blop') and saintly human self-sacrifice (only ultimately comprehensible as a response to grace); whereas the 'eyes of faith', on the religious side (to use the early 20<sup>th</sup>-century Jesuit Pierre Rousselot's term), can discern the phenomena of 'cooperation' ('blip') as already indications precisely of trinitarian and incarnational effects. What we have here, in other words, is a manifestation of a two-sided 'bridging' model of the relation between evolutionary biology and philosophical theology in which science acknowledges its explicative strengths *and* its limitations, and theology and metaphysics together strive to complete the vision towards which 'evolutionary cooperation' already seemingly gestures, albeit considered now at a different, and 'primary', level of causal explication.

On the scientific side first, then, the phenomenon of cooperation (blip), seen now to be as deeply inculcated in the propulsion of evolution – from the bacterial level upwards – as Darwin's celebrated principles of mutation and selection, provides a significant modification of the 'nature red in tooth and claw' image that Darwinism early accrued to itself from Tennyson's *In Memoriam*. There is no less suffering or 'wastage' on this model of evolution, to be sure; but what there *is* is an ever-present tendency *against* individualism or isolationism, which only the application of the game theoretical calculus has been able successfully to explicate. The fear, then, often expressed by the Vatican, that the embracing of 'Darwinism' *per se* somehow encourages hostile competitiveness or individualism has to be severely modified. At the very least, and in advance of any ascription of religious meaning to the phenomenon, evolution at significant and crucial junctures *favours* cooperation (blip), costly 'self-sacrifice' and even 'forgiveness'; it favours in due course a rudimentary human ethical sensibility (so Marc Hauser, in his recent *Moral Minds*), and thus delivers – already in the realm of the higher pre-human mammals – tendencies towards empathy, towards a desire to protect others close to one at the cost of personal risk. At the very least, then, this is the

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<sup>6</sup> Not exactly either 'dialogue' or 'integration', on Barbour's terms (unless one could say 'bi-level *and* dialectical integration'); nor as theologically Lindbeckian as McFarland presumes in his article on theology's 'compatibility' vs 'integration' axis: the 'type 2' compatibilism that McFarland favours involves the supposition that 'doctrine's job is not to account for facts ... [S]cientific facts play no programmatic role in the formulation or elaboration of Christian beliefs' (p. 197).

evolutionary seed-bed for higher, intentional forms of altruistic ethical ‘virtue’ (blop), although these latter (with their complex forms of human intentionality and freedom of choice) are of a distinctively different sort from the pre-human varieties of cooperation, and cannot in my view be *reductively* subsumed under mathematical prediction. (Therein lies the real danger of reductionism in this story – to a narrow utilitarian calculus of ‘gain’ such as many *economists* assume rather than argue in their current use of evolutionary game theory.)

From the philosophical or theological side, on the other hand, and secondly, these same phenomena may suggest the possibility of some new, modestly-enunciated form of ‘moral/teleological’ argument for God’s existence (so Alexander Pruss, in an intriguing forthcoming essay in a volume I am editing: the existence of ‘blip’ is a natural but already teleonomic phenomenon; the existence of ‘blop’ implies a new normativity which evolution *per se* cannot deliver, even though it can prefigure it). Not that such an argument could ever amount to a ‘proof’ in the deductive sense, but rather be a constituent in a *cumulative* set of considerations that would together mount a case precisely for an incarnational and trinitarian God, a God of intimate involvement in empathy and suffering. In this sense, then, not only would the ‘no contest’ view of science and religion be modified and enriched, but both sides of the ‘evolution’ and ‘science’ divide significantly transformed in their understanding of their relation. To be sure, the agnostic or atheistical evolutionary biologist would continue to question (if not actively resist), the ‘necessity’ of any such metaphysical speculation about the existence of divine providence; but the difference from an older perception of the two discipline’s relations would be the explication of at least a *theoretical* capacity for bridging (not merging) the two discourses by discussion of particular scientific evidences and their potential meanings. On the theological side, the great advance that this development would bespeak would lie in the intrinsic and immediate attention given to the doctrines of incarnation and Trinity, rather than to the covertly deistic God who has – to great spiritual detriment and imaginative constriction - so dominated the science/religion debates since the Enlightenment.

‘God, Providence and the Evolutionary Phenomenon of Cooperation’

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I: *Introduction: How A Game Theoretical Account of Evolutionary ‘Cooperation’ Makes a Difference to Classic Darwinism*

*Thesis:* Replication, Mutation, Selection *and* Cooperation are needed to account for constructive evolutionary development. ‘Cooperation’ = a strategy costly for an individual in terms of fitness (whether genetic or cultural). ‘Altruism’ (which *ex hypothesi* builds on ‘cooperation’) = the *motivational* addition to ‘cooperation’ supplied by the good will or love of an individual making a costly choice for the sake of another. Five Rules for the Evolution of ‘Cooperation’, according to a game theoretical account (Martin A. Nowak, building on earlier work by Haldane, Hamilton, Trivers): kin selection; direct reciprocity; indirect reciprocity; network reciprocity; group selection.

Key question: how, if at all, can this game theoretical understanding of ‘cooperation’ affect, colour or change a *theological* account of the relation of divine providence and evolutionary development?

II: *A Thought Experiment to Link Classical Christian Theism (in the tradition of Thomas Aquinas) and Evolutionary ‘Cooperation’*

*A Three Fundamental Problems in the Relation between the Created Realm and Divine Providence:*

1. Divine Providence and Pre-Human Evolution: avoiding the ‘big bit-player’ idol. A trinitarian and incarnational proposal: Geach’s ‘chessmaster’ analogy, doctrinally modified - relating *Summa Theologiae* III to *ST I*.
2. Divine Providence and Human Freedom: avoiding the ‘competition’ model between human ‘autonomy’ and divine providence. Optimal human freedom as complete (‘christological’) submission to the divine plan.
3. Divine Providence and the Problem of Evil: avoiding the supposition that dying/extinction is the worst thing that can happen to any individual. The evolutionary possibilities of maximal ‘cooperation’ with God or maximal ‘cooperation’ with evil.

*Transition: Unsatisfactory Options in the Current Debates about Evolution and Providence*

1. Dogmatic atheism; 2. ID; 3. The ‘lazy’ form of the no-contest position.

*B. How ‘Cooperation’ Makes a Difference to Systematic Reflection on Providence:*

1. Pre-Human ‘Cooperation’ as evolutionary *praeparatio* for Virtuous Human (Morally-Significant) ‘Altruism’.
2. Prospects for a New Moral-Teleological Argument for God’s Existence (from the ‘Eyes of Faith’).

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