

Sarah Coakley
After-dinner Discussion
18th November 2008

Bob White: We've got an hour now to have a discussion around the topic of what Sarah's been talking about this evening: it can be wide-ranging and it would be great if everybody got a chance to say something. An edited version of this discussion will be put on the Faraday website at www.faraday-institute.org along with a transcript of the lecture.

If you look at the Faraday website under "Lectures" you'll find the first one in November 2000; it's a great set of talks by eminent people of whom Sarah is the latest. I think they are a great resource. The idea came from the Royal Society which Brian and others here will know of, which held discussion meetings when they had lectures and then the discussion was printed. One of the fascinating things about the printed discussions is if you go back and look at my subject for instance, the plate tectonic revolution in the 1970s, you can see what people were saying about it in the field at the time. You can see those who didn't like it at all and those who were excited about it and so on. Often those comments are even more interesting than the lectures!

Denis has kindly agreed to give us some starting thoughts and direction and then we'll perhaps have several comments before asking Sarah to respond.

Denis Alexander: First of all I do want to say how much I enjoyed the lecture this evening. I found it very stimulating and have jotted down some thoughts, some of which I think will be useful for discussion around the table here.

I wondered if we could start by reflecting a little on the genetics of animal and human behaviour. To the best of our knowledge animals just do things the way they do them and don't have that acute awareness or sense of choice that we do. When I read these mathematical analyses of human co-operation and altruism and so forth, it often seems as if the genetics is being ignored. The maths might well fit perfectly well irrespective of whether this was a genetic deterministic story or whether it was actually a personal choice story, describable in purely sociological terms. So we are left wondering whether all the maths is a story about our evolutionary biology (so involving genetic variation) or a story about differential human behaviour which actually has nothing to do with genetic variation. So I wondered at some stage in the evening if we might reflect a bit more about that and perhaps the zoologists could help us.

Second I was intrigued by the idea, which I understand as a question of philosophical exactitude, that evolution doesn't really provide an explanation *per se* for the origins of biological diversity. I think I would like that to be clarified a bit further as we go along and ask in what sense does it not count as the best explanation if scientific explanations, as I believe, are really about the inference to the best explanation, especially when we are dealing with the historical sciences such as geology and evolutionary biology. At one point in your lecture I thought there was an attempt to dissolve the demarcation line between primary and secondary causation which I found intriguing. As a scientist I always think that what I'm doing is studying the secondary causes, and I'm not really doing anything in the laboratory about primary causes. I did get the impression that at one stage we seemed to be fusing the two, and then at another stage they seemed to be still quite distinctive and I would

certainly appreciate a little more clarification on the whole concept of causation in the theological and scientific contexts that you were mentioning.

Coming more now to the theology and thinking of “blip” as a pale reflection or a pointer or a hint of things to come, the “blop”, one of the points about co-operation within a species and one great characteristic about the era of “blip” is of course that it’s an era of huge competition between species where one is eating another and where 99% of species go extinct, and where you have a huge food chain going on. Cooperation looks quite “bloppy” when you’re looking within a species, but when you’re looking between species then we have the whole question of the suffering, death and struggle involved in the evolutionary process. I just wondered whether that should become more part of the equation, as it were.

The last point I am going to make is on evolutionary biology. One could argue that evolutionary biology is irrelevant to the real kind of sacrificial, self-giving altruism, that you find in human populations and which I don’t think really has a solid biological explanation. So I wonder whether we should even worry about evolutionary biology in that context, if we are now making choices and living beyond our genes. For example, we don’t go around trying to justify democracy by evolutionary biology and although perhaps some people do, I wouldn’t want to do that, neither to justify other types of political system, or certain ways of running our families or other kinds of social things that we do as socialised human beings.

Therefore I think it’s worth asking the question whether the evolutionary biology story is actually particularly relevant to real forms of altruism and whether we should even get into the mathematics of it and worry about it, or whether we shouldn’t simply say that we are now human beings with brains with big frontal lobes and we should therefore use other forms of discourse to justify our beliefs and ways of doing things as a human society. It would be interesting to bat that round a little bit as well, so I was just throwing out a whole smorgasbord of thoughts, hopefully enough to keep us going for a while!

Sarah Coakley: Can I try and answer that one first of all and then return to the other points. By the way, in answering any of these I would like other people to come in on it because I am deeply aware that all this is still up for discussion given the temporary conclusions we might have come to.

I don’t agree with you, actually. I think that the evidences of continuing research is becoming more fascinating and more suggestive of possibilities in which, under conditions where you wouldn’t expect anyone to do anything other than selfish things, they actually do. So one of Martin Nowak’s most celebrated recent papers which I didn’t mention in this context is called, for the purposes of the press, *Winners Don’t Punch*. Contrary to an awful lot of economic research into repeated “prisoner’s dilemma” undertakings, he has shown in one very important long-running set of experiments of students at Harvard done at the Business School, in really narrow monetary-related set of experiments, that people who are resilient and able to forgive and don’t divert by punishing are the ones who win, long term. And this is really revealing and interesting, isn’t it, morally.

Tim Jenkins: The point of the argument is the artificiality of the “prisoner’s dilemma” in the long runs, which actually isn’t a very good simulation for conscious human behaviour. They don’t sit there and say “Well by 14,000 they did this, by the time they got to 23,000 they did that ..?” This is the point about such human beings.

Sarah Coakley: But this raises enormously interesting philosophical and anthropological questions. In other words, what are the presumptions that are fuelling that observation? Pastoral observations where people get hurt rapidly and then give up? What's your evidence for that?

Tim Jenkins: I was coming at it from the other end.

Sarah Coakley: This is a conversation from yesterday. When you look at that the point is that you are using, as it were, evolutionary time in order to produce your apparently ethical consequences, immensely long runs (usually about two hundred generations) but the selfish behaviour has rather begin to become to come unstuck.

Sarah Coakley: Let's bring others in here. Are you talking about the research in the 1970s when you were a zoologist?

Tim Clutton-Brock: Certainly in the response time animals discount heavily so animals – and humans – tend to regard an immediate reward of a relatively small kind which they are likely to get with reasonable certainty in the near future as preferable to a much larger reward over a much longer time span. So I would slightly disagree with your basic intention that one has to think in terms of many generations. One has to think of it in those terms if one is thinking about a genetic response and in that case that applies to both humans and animals.

I would take rather a different line. I think there are many ways in which the "prisoner's dilemma" is extremely artificial and Martin Nowak takes, from my position, an extreme mathematician's view of this which is largely unconnected to observations of what I? was doing [**Sarah Coakley:** He acknowledges that. **TCB:** Sometimes..!] in the context of the "prisoner's dilemma", where it is set up in a way that the top payoff is if your opponent cooperates and you don't. In contrast to that a very common phenomenon in animal societies would be a situation where the top payoff is if you both cooperate and any other payoff is reduced. Now that, in my impression, would be the normal situation for most kinds of animal cooperation. I think the problem, or the thing that is difficult to explain, is the extreme cases of altruism in humans as in cases of the lifeboat men who risk their lives for others, Leonidas and the Spartans at Thermopylae and so on and I, rather like Denis, would tend to regard those as cultural phenomena rather than evolutionary phenomena. You can if you want to cast that into a framework of gene culture code .. which basically suggests things that are good for local groups are likely to be favoured by selection and maintained by culture and there are various models of this, but those are specialised models which apply exclusively to humans which can generate traditions based on language and enforcement?, very different from animal societies. So for me the animal situation is rather simpler than you describe and is rather more different from what goes on in humans.

Bob White: Barry – do you want to say something?

Barry Keverne: I agree with the distinctions Tim makes with respect to comparing animal studies with humans. It is important to ask the extent to which you think this represents a social and cultural component of the way they behave? How much do you think culture is determined in their response? Where does this fit into the picture of evolution in animal terms?

Sarah Coakley: I don't think the mathematical approach can answer these questions. The reason I defend the mathematical approach, however, as non-reductive as such, is for both its precision and its modesty. It's only if you take it to be an explanation that was meant to cover everything, which I don't think it does at all. I described it in an article I've done this week for the *Church Times* as a thin purple line, all you've got in this mathematical approach is precisely that, a mathematical approach. But those patternings are fantastically interesting. However, they don't in any way account for any of this stuff that you're looking at which I think is also fantastically interesting. We need all these perspectives to get the full picture. The wars arise when we are trying to work out whether we have to choose between them. I would respect either. I would say let me have the mathematical approach as it gives me the kind of big picture.

I can see the thread that runs all the way from bacteria through to humans and then I want to muse on that as a philosopher and ask what it means. And what difference is made to it by the admixtures at the animal level of these co-opted, co-operative interactions, which seem to become much more important, and then at the human level we have another set of conundra which is to what extent does the mathematical bit count as an explanation, in what sense of explanation. That's where the philosophical stuff really becomes important and to what once I add genetic, cultural and other factors. So I think you're all right to make these objections but I don't think we need to make choices. Is that fair?

Bob White: We had an interesting talk here from Professor David Martin, a sociologist, who said frankly that sociologists have never predicted anything, not even major developments like the collapse of the Soviet Union and the fall of the Berlin Wall. So we had a discussion about whether or not sociology is a science [available from the Lectures folder on www.faraday-institute.org]. That sociology was done mathematically on the basis of groups of agents doing things, so humans are clearly very different from animal agents.

Tim Clutton-Brock: I would like to come back on something you were saying. You were saying that this thin line doesn't explain an enormous amount, but you were using the framework of Nowak's models to explain the evolution of sociology? and social insects. and I would have said it had very little, if anything, to do with that.

Sarah Coakley: Really? Can you say more on that?

Bob White: I would just say I can see all the nods from other biologists around the table.

Henry Disney: I think you've perhaps underplayed the "red in tooth and claw" aspect. About ten per cent of multi-cellular animals are parasitic and that's a conservative estimate. The habits of many are excruciating and then there's all the predation and the like, so that altruistic behaviour is a minority behaviour in a very small number of species. So if you're thinking about the benefit of an "involvement" in the process, well then what's this "involvement" doing with all this mess with the rest of things.

Sarah Coakley: I did raise that, but how insignificant is that blip factor though because, if Nowak is right, there couldn't be what he called "constructive evolution". That is we couldn't move into new and higher forms of evolution without this particular factor so it's all a matter of how you weigh the significance and with what eyes you are looking. I'm not going to deny the atavistic dimensions of evolution, that would be stupid and I'm not trying to, I hope you didn't hear that. I am just saying that that isn't the whole picture. What I find really fascinating about Nowak's discoveries, if you can call them that, as he's building on other people is that because he's looking only at the mathematical level he can give us a big picture at a mathematical level, which shows that those who use merely words to describe evolution in extremely hostile and competitive and negative ways have just not got the whole picture. It doesn't mean that everything in the world is lovely, it's not, as I said. Don't you find that interesting?

Henry Disney: I think it's interesting, but there is no inevitable progress in it. There is a trend of increasing complexity but there are also trends of increasing simplicity, particularly among parasitic organisms. It's all stochastic and random, it's not predictable. You can explain it in retrospect, but at every point you are flipping a coin and it could go either way. You could explain the evolution in retrospect but you can't predict early stages.

Bob White: Simon Conway-Morris makes this point: the eye has evolved nine times or so completely separately and independently in different species at different times. It's as if there's a restrictive range of organisms that work and they just keep coming up. Brian, I think you introduced me to the "prisoner's dilemma" at a Christmas party once, could you comment?

Brian Heap: It's quite extraordinary, by the end of the competition people who were really in very antagonistic positions became quite friendly. I would like to broaden it but perhaps this is not the moment to do it.

Sarah Coakley: Each of Denis's questions is extraordinarily good and I think we should all talk about them at some point – I don't think only I should talk about them.

Brian Heap: Let's take Denis's and come on to some of the wider aspects later.

Denis Alexander: Well, I posed the question.

Bob White: Could you give a thumbnail of each one.

Denis Alexander: My first point was the question as to whether the maths of altruism would fit to models of human behaviour irrespective of whether the roots of differential human behaviour were in genetic variation or in unrestrained choices? In other words, would the maths come out the same irrespective of whether one was addressing genetics or sociology? My second query related to the distinction between primary and secondary causes. The third point is if "blip" provides a pale shadow of "blop", and cooperation in the era of "blip" applies particularly to intra-species cooperation, then how do we fit in the inter-species competition that characterised "blip" – in what way do we fit that into a later "blop" story. My fourth point relates to the justification of non-scientific beliefs, suggesting that evolution

might be irrelevant to the question of real human altruism in the same kind of way that evolution is irrelevant to justifying democracy rather than fascism, or something like that.

Bob White: I heard you throw out a challenge to John Polkinghorne about kenosis to do with the second of these points on evolution and explanation and how it actually works, how does God work in the world, does he work through evolution, how does he do it. John, did you want to come in on that?

Sarah Coakley: Poor John!

John Polkinghorne: I very much resonated with your evocation of Romans Chapter 8.

Sarah Coakley: I remember our discussing that in Doctrine years ago . It seems to me that the determinists are trying to have their cake and eat it in this respect. Of course God must concur in every event that happens because God maintains the world in being and if God did not do that the events would not take place.

But surely there are many events that take place that are pretty clearly not in accordance with God's will and that presumably means that God has allowed a freedom of causality for example. I think it's also true in a rather different way, perhaps freedom isn't the right word, in relation to natural disasters like earthquakes and things of that character. It seems to me that they've to allow those things to happen, which are contrary to God's ultimate intentions and that is a self-limitation on the part of God in allowing a created other truly to be itself. I don't myself see how you can get round that. No doubt those events in which human freedom is exercised in the world represents an optimal form of human freedom. But it's an optimal form that only intermittently and not too frequently we probably realise and I'm just sort of puzzled about that.

And I would like also to say that I would very much agree on your third point and again as you said it is so difficult without seeming callous but death and extinction are not the worst things that can happen. What that means, I think, from a theological point of view is that *cosmology* only makes sense if it is combined with eschatology. And the question of eschatology fundamentally is do we live in a cosmos or an eventual chaos, does the universe really make sense.

Bob White: Rodney, do you want to come in here?

Rodney Holder: Well, I'm just as puzzled, to be frank. I think it was a great talk. One of the things you mentioned which resonates with me as a chess player is Geach's chess grandmaster. That still sounds like competition though [**Sarah Coakley:** That's why it's slightly inadequate. **Rodney Holder:** Quite.] I find helpful the analogy that John Lucas had about the Persian rug-maker. I don't know if you know that. You've got the child making a rug and weaving from one end of the carpet and the father of the family weaving from the other end so whatever mistakes the child makes eventually you get the thing woven into a beautiful pattern. And I rather like that image. But I'm still puzzled as to how you translate any of that into God's action in the world because it's an analogy, so what is the means of divine causation in the world? Sustaining, co-operating, pouring himself into the world? Yes, but what does that mean God actually does?

John Polkinghorne: Does God make a difference in the world? I think it is entirely consistent that God can bring about determined purposes by contingent paths, which is really what the chess analogy is saying. The child [club player] can make whatever moves he or she wishes but the cosmic grand master will win the game. David Bartholomew, particularly in his book *The God of Chance*, is very helpful about that in the way in which contingency and fulfilment interlace in subtle ways.

Bob White: Does anybody else have comments on causation, the way that God works in the world?

Sarah Coakley: I can try and respond but I think I am going to call on Janet Soskice to my assistance here, as an expert on Creation. Let me just say immediately that Geach, for all his termism in using the grand chess master analogy, is falling into his own trap in that we have already got an anthropomorphic model, so there is a competition going on between two humans, albeit very different kinds of humans. So can we just bracket that one out because it's not helping us here in trying to get the vision of the distinctive causality of the divine which I think Thomas is after.

I don't know how I can convert you to this, other than to say that it seems to me that the way you want to go ends up, for me, in a spiritual absurdity of competition or withdrawal. So John Polkinghorne's model is that God has to get out of the way and allow us to be truly free – but I would say you can't possibly be truly free if God is out of the way because (a) God is never out of the way and (b) to be truly free we have to be fully in line with his intentions rather than, as it were, released from his intentions. So I think that the intuition of the picture that John has is of a loving Father who has an adolescent son who needs to be given a little bit of rein, so he gets out of the way and gives him some money and goes off to Iraq, say, and does something interesting and that allows him space to be himself. But that's not what I think is the vision of freedom, true freedom, that I'm after which aligns with this bi-level causality that Thomas describes, not without amathetic difficulty. There's no doubt about it because divine causality doesn't work like human causality at all for Thomas. It's not where do I insert this thing called the mind causality so that I can make space for it. It's this mind-blowing idea that there's absolutely nothing I can do including continuing to be here this evening without the divine causality of holding me in being.

John Polkinghorne: It is not an issue that God holds the world in being. I was rather shocked when you quoted me earlier as saying that God needs to get out of the way. If I said it, a very ill-chosen phrase on my part! If you do believe that the act of creation is a kenotic act and nothing restricts God from the outside, then God internally restricts the exercise of various divine powers in order to give some gift of freedom to creation. If you believe that, then you can also believe, I think, that God condescends to engage with temporality in a temporal way. I also believe that God in creation also condescends to act providentially as a cause among causes within the open process of the world.

Sarah Coakley: I understand the position entirely and I deeply respect it, John, I just don't share it! For me the vision of God is not basically one of God allowing space for freedom but God continually suffusing us with the possibility of our complete resonance with him. We don't always do that, obviously. In other words, we have

every opportunity not to do that. It's not that he gets out of the way and then lets us see what happens, it's rather that there's no possibility of him getting out of the way. That is inconceivable.

David Ford: John has already recanted that phrase!

Janet Soskice: Well, I don't know if I could say anything different and I would probably say the same as Sarah (**Sarah Coakley:** Hurray!) but what does God do and how is God a cause amongst causes? If you go back to the lynch pin of the Christian/ Muslim/Jewish doctrine of creation as it became, which rested on creation *ex nihilo*, this was pushed because of views about the sovereignty of God and God's graciousness that all that is his gift. So God does not create out of any compulsion, God is free in creating and God creates everything. There's no pre-existent model such as that of Plato and God creates space and time. So immediately, if you've got God as creating space and time, God is not a *creature* of space and time and this introduces an enormous amount of reflection early on on what can it be for God to act. Because although we have to say things like God *acts*, any God acts as we act, at a certain level we have to realise that we are speaking parenthetically because God can't simply be an actor, in the same way that we are actors. Not through kenosis, not through anything, because that is a derogation of being a Godness of God.

This doesn't mean that from our point of view God can't *act*. So along the lines of a classical definition that Sarah is defending that I too would commend, it isn't that God is standing seeing an unfolding sequence, God is totally always already present happens for us in sequence. For us it's happening in stages, and all that is happening is happening in God's will. If you wanted to take an extreme example, does God respond to intercessory prayer, Thomas would say "Yes" but that's built into the fabric of God's creation.

God understands that at a certain moment John Polkinghorne would pray for wisdom and then he preaches his sermon and it would be granted(!). So this is not without its own problems but there are a lot of other problems with going the other way and as Sarah highlighted, the danger is always of deism. I know no-one wants to abrogate? this, that God may be just a player amongst players and that is theologically difficult, but it's also in the end very morally difficult too. So then perhaps we need some explanation of the nature of evil. Again all these things are interconnected. (**Sarah Coakley:** The choices you make.) Yes, and that evil is fundamentally a privation, it's not something that God wills but it's a lack. Again the idea that evil is a privation is there in stoic philosophy too but it's embraced by Christianity early on and it's woven into this, but it isn't as though God wills evil things. On the other hand God is holding in existence this world where terrible things happen, Baby P, and things like that.

Bob White: Can I ask a broader question on that question of evil. I asked after the lecture if evil could exist before human consciousness and you said of course it could. May we reflect on that a little bit, because that's suggesting that God created evil, isn't it?

Sarah Coakley: You can't avoid it. God does create everything and therefore God indirectly created evil, except that if you perceive evil as a privation of good then that

tones the way you are thinking about God as the creator of evil in a very significant way.

John Polkinghorne: It's a pretty hard thing to hold after the 20th century, a merely privation view of evil.

Sarah Coakley: Well, I know that everybody says that and I understand why they say it. But I think when they say it they are having a rather pale vision of the privation of good. They think that privation of good just means "Oh, I had a poor day on Tuesday, I didn't get much work done" but if the privation of good is really a devastating state whenever it occurs, then it's no more devastating in the 20th century than any other century.

Bob White: Can I draw you out a bit and ask what parts of the natural world, (evolution is perhaps one we are talking about), were evil before humans came along? Which part of that are we going to say that is evil? Because we know that if it wasn't for that process of evolution humans would not be here, so is there a certain amount of evil allowed for a greater good? Where would you put your finger on the evil in the process of evolution?

Sarah Coakley: That's a very, very good question. I'm not sure that I've thought enough about that to be able to answer you in a kind of flip way. To say that there was just a kind of Elysian state until humans came along and messed it all up seems to me to be crass. But to have that sort of view, bunnies hopping in the background, and to say exactly what it is that's evil and what isn't I find very hard to judge because I think God ultimately must be the judge of that. In other words, what about your people eating each other up?

Bob White: Organisms, not people.

Sarah Coakley: Is that evil? Yes but that's a very interesting question.

Henry Disney: What about yellow fever viruses and such like? That's what seems to me is being avoided because the world is replete with these things and human suffering.

Sarah Coakley: But are they evil only because they cause human suffering or are they evil because they are.

Henry Disney: Rampant throughout the world of living creatures?

Bob White: That was my question, referring to the pre-human world. I thought you had given the answer yourself because you said "Death is not the ultimate horror," it's separation from God which is the ultimate horror. There's a lovely bit in *The Restaurant at the End of the Universe* [Douglas Adams' second book in *The Hitchhiker's Guide to the Galaxy*] where a cow comes along and says "Please eat me, I like to be eaten", thereby fulfilling its function in life. That's a sort of flip argument but death is part of life and therefore in some ways death is a good thing. Though in the book, the cow comes back to life each day because time is rolled back each time, so it's not quite an exact analogy.

Sarah Coakley: But then we come back to what about intensely long and agonising animal suffering, long deaths, mutations which cause terrible suffering. Again, this is from the perspective of our human retroactive vision, so only if I put myself wholly from the perspective of God could I say that is a serious mistake as opposed to that is a necessary evil and a route to something much better. I find this very hard to assess in general.

David Ford: I was just thinking about what is the worst thing that can happen. Classically, it is neither death nor suffering nor evil inflicted on one by other people, causing immense suffering, because that comes to an end and so forth; whereas, sin is the ultimate horror.

I wonder if I could come from another angle. It's about the use of Aquinas. Aquinas comes out as the great hero of this story. (**Sarah Coakley:** In a slightly modified version.) I know you faced this issue and I'm interested in hearing what you say.

Obviously, Aquinas was using Aristotelian science, and he did his theology in relation to that and there are two questions that arise. One is did it have any effects on his theology at all that he was using Aristotelian science, and is it just a very nice, happy accident that his work suits almost perfectly modern science as well as Aristotelian science? But if it is the case that he's fine theologically, then is there really any serious interaction between science and theology? Let me put it this way. If one were hearing your lecture tonight in terms of the theological points you were making and reading it through, let's say, the lens of a Thomist like Karl Rahner which had things to say about evolution (**Sarah Coakley:** Why would you do that?) – though it wasn't the prime thrust of his theology. I suspect that nearly all of your theological points would emerge, such as the nature of God and the utterly non-competitive relationship between human freedom and divine freedom. The most wonderful expression of that, it seems to me, is that human freedom increases in direct relation to divine freedom, rather than in inverse relation. So it's the exact opposite of autonomy meaning to be free from God.

I think you can find much of what you said in Rahner, without having engaged with contemporary science in the same way. But the first point is about Aristotle and Aquinas happily matching up with modern science.

Sarah Coakley: Well it doesn't very happily match at all! One of the things towards the end of the three year project – and by the way I think I have said this to a couple of you privately – when Martin and I set out on this project we had absolutely no predisposition to favour Thomas Aquinas, absolutely none. It's true that Martin is a Catholic and must have imbibed a certain amount of mandated Thomist theology in his High School years in Vienna, but we were actually quite likely to go the way of John Bogimore? It would have been much easier, signed up to the usual ticket. But – how can I put my finger on this – it's something about the cosmic vision that Thomas has of the, as it were, regulatory patterning of the entire cosmos that is written into his understanding on the arguments about the essence of God, that attracted us and become more and more attractive to us to the point where, towards the end of the three years, Gene Paulter from Notre Dame (who became part of one of our afficiandos) actually put it to the assembled mathematical team, an evolutionary biological team, that we ought to reconsider the Aristotelian notion of

formal cause in relation to evolutionary phenomenon which has been deeply out of fashion – in other words, to think of evolution itself as teleological.

I think that that kind of Aristotelian notion has been deeply out of modern thinking about science and I think it's due for a revival, partly because of this mathematical patterning approach to evolution which does appear to have this regularity. So that's how we came to this – I could say more about that. Rather it seemed to me is so dominated by an ultimately Kantian and Heideggerian subjectivity as the starting point, you know the human and its existential questions is where he begins, he doesn't start from a kind of breathtaking observation of the whole spectrum of evolution. So I think that Thomas is more attractive for that reason now, in the way that evolutionary theory is going.

Janet Soskice: Can we not lose that point that you made about teleology because Simon Conway Morris said the eye has developed in twelve different ways and again thinking of this idea of the givenness of the world, you don't have to get it from Aquinas. But there is something in that teleology which in the tradition goes back to Aristotle, to which the organism is responding that I think is highly compatible with the topic under discussion tonight.

Henry Disney: Ernst Mayr made an important distinction between teleology and teleonomy. Most of what's labelled teleology in biology turned out to be teleonomy and I think we want to avoid that trap.

Sarah Coakley: Teleonomy means the laws of ends?

Henry Disney: It is directed towards a particular outcome that serves some biological purpose. But it's not directed by an external director because biological structures and mechanisms are adaptive. This is the important aspect. Likewise with physiological processes: they have an end point but they are not thereby teleological. They are teleonomic in the best writing by biologists.

Sarah Coakley: How are you reading teleology here? Full theistic theology?

Henry Disney: It's one of these words that gets very slippery and should be avoided in discussion of biological processes.

Sarah Coakley: It just means end-order, end reason, doesn't it, but the way you are using it implies a theistic ..

Henry Disney: Teleology is not actually teleonomic in that sense. Teleonomy is adaptive, it has an end point but it's not pre-determined by some external "director".

John Polkinghorne: No, but it's not a drunken walk through an endless possibility space.

Bob White: George, did you want to come in? I interrupted you earlier.

George Pitcher: My earlier interjection was related to that question of evil even predating consciousness and I wondered whether that birth of evil, if you like it's a sort of creation narrative, related to the point of creation inasmuch as God can't be

contained within any sort of temporal perspective. Whether that dates from a point of creation where a God can't create himself in another state of perfection and therefore is bound to create, is almost willingly creating, an imperfection which is bound to contain an evil. I would welcome your reflection on that. And I suppose journalistically I am just trying to follow up with two quick questions, one of which is – I am sorry if this is reductionist, it's probably rather simplistic but that's why I say "journalistically" – the extent to which in scriptural terms "blip" is an Old Testament perspective and "blop" is a New Testament one. (**Sarah Coakley:** No.) Well I thought not. I'll take it at that basis, because that's fine.

More practically speaking from my point of view, if I had a pound for every time somebody came on the Telegraph website and accused me of believing in an invisible sky fairy I'd take you all out to dinner – and we'd go somewhere nice! In that context it comes home to me in the nature of my work that there seems to be something peculiarly specific about one point in your address this evening when you were referring to did you say militant or dogmatic atheism? (**Sarah Coakley:** dogmatic atheism.) It may only be because it's in my lifetime and therefore it's all I can compare it with, but it seems to me that this has grown up now with such a vehemence that it's almost, to my perception, part of the created process. It's there, it's a cultural phenomenon certainly. Therefore, whilst anybody of any view is to be respected, just on a cultural basis I wondered whether my efforts to respond to that have largely been vocational, pastoral, all that sort of thing but I'm actually wondering whether that's a little feeble in as much as actually this is something to be confronted as not to be argued with in relation to dismissing but actually *understanding* in relation to its role in the creative order, certainly culturally. What I really wanted was a tip from you as to how to stop responding to that simply in terms of "Well, you know, I have read more than you have".

Bob White: Does anybody else have comments on this sort of area?

Barry Keverne: Can I say that if you maintain that sin didn't exist until we had mankind, is it not also the case that God didn't exist until we had mankind?

Sarah Coakley: No, I didn't maintain that, I said the opposite. I think there was sin but ..

Bob White: Sin is a human activity.

Barry Keverne: Is it not plausible that you can make another case in the same way, that God didn't exist until we had man?

Can I expand on that, because one of my interests is in terms of brain evolution and the human brain is part of the evolutionary continuum. Nevertheless, it is also very distinct from the continuum in terms of both its size, and much more importantly, its development. Most of human brain development occurs after birth; it grows until the age of seven and it continues to grow and rewire until the age of twenty-one. So it's very much in tune with the environment and changing environment.

It's also the case that *all* mankind, it doesn't matter which social organisation, which culture, have beliefs and they believe in gods – some in many gods, some in one god, the gods are all different, but there's a belief system there and even the most ardent atheist has beliefs: beliefs in standards, moral standards, ethics. I

maintain that the human brain has got so complex that it needs to have a self-reference point, we have to take perspectives on ourselves. We are always measuring ourselves up against an internal representation of ideal self, be that self through a religious ideal or self through our own moral ideal. If you do MRI scans on the brain when people are thinking in the self-referential introspective way, there's a part of the brain which is uniquely human that lights up, the median pre-frontal cortex. Interestingly, when very religious nuns sit and contemplate and feel at one with God, then in this state of mind it's exactly the same region of the brain that is lighting up.

Sarah Coakley: I don't find that surprising. What follows from it – in other words I think I am hearing underneath your discourse a suggestion which is actually presented at Harvard to undergraduates as the gospel truth that religion emerges at a particular point in evolutionary development: hunter gatherers, ethical systems and basically followed by a caring account of how humans need to have projections to dialectically or self-reflexively justify their existence, that's what religion is. Now there may be some truth in that but, of course, as a theologian I utterly reject it because although it gives an evolutionary and brain science account, it ultimately falls short of metaphysical claims about truths of the sort that I want to discuss.

Barry Keverne: But I wasn't saying that that's what religion is, I was just saying that's what beliefs are and those beliefs can have many different forms of which our Christianity is just one.

Janet Soskice: Yes, but your first point was ontological not epistemological, you have shifted gear! You said maybe God only came into existence – that's an ontological point – now you're making an epistemological point.

Barry Keverne: True, but they are two separate points. What I am saying is that many of these beliefs in many different cultures take many different forms, often involving a deity. It's also the case, and I think you'll correct me on this if I am wrong, that when the brain dysfunctions, so when you have epilepsy for example, you can develop a sense of aura, a sense of being in the presence of another supernatural presence. Moreover, there are people who can actually self-induce this epilepsy because they enjoy that experience. What I am getting at is this complexity of the brain that can contain all of the predispositions for these events to evolve in a social and cultural way.

But I said I use the term "loose" because that is what I think is important. What I am saying is that many of these beliefs in many different cultures take many different forms, often a deity. It's also the case, and I think you'll correct me on this if I am wrong, that when the brain disfunctions, so when you have epilepsy for example, you can get a sense of aura, a sense of being in the presence of another supernatural presence, as it were, and there are people who can actually self-induce this epilepsy because they enjoy that experience. What I am getting at is this complexity of the brain that can contain all of the predispositions for these events to evolve in a social and cultural way.

Sarah Coakley: I entirely agree, I think that is in a way non-controversial. The controversial matter comes when we go after George's questions, is there in addition to whatever is happening in the brain a metaphysical state of affairs and how could you possibly adjudicate that? George is worried about the fact that there seems to

have been such a shift to dogmatic atheism in this country. At least, people write to him with that thought, and I think he is wondering if that in itself is in some sense a kind of evolutionary cultural development.

George Pitcher: Is it there to be embraced by people of faith, rather than simply, in your terminology, competed with. I am increasingly of the view that I shouldn't be competing so much as seeking to understand its contribution to God's purpose.

Sarah Coakley: The Jesuit Michael Buckley wrote a very interesting article some years ago called *Atheism and Contemplation* in which he argued that the dogmatic atheisms of the late 19th and early 20th centuries are curiously the sort of back formation of purifying contemplation undertaken by people who realise that their perspective on God is too small, is idolatrous and so on. The enormous waves of atheism that they are having may in a rather curious way be purgations of false notions of God – if that cheers you up at all!

George Pitcher: And inviting of a second innocence. (**Sarah Coakley:** Yes)

Bob White: We must stop shortly but let's give people who haven't spoken yet a chance to comment.

Ming Tsuang: I just got here early this morning from the United States and it's overwhelming to attend this discussion and to listen to your lecture. I was very, very impressed: it's a different field from ours and I had to concentrate to understand what you are talking about, but I got the essence of it.

At the beginning of your talk you briefly mentioned forgiveness, but you didn't elaborate. While I have the opportunity I would like to hear briefly from your text what forgiveness means. The reason I ask this is that I have received research grant support from "A Campaign for Forgiveness Research", and the Templeton Foundation to study genetics and environmental influences on forgiveness using twin samples, so I wonder if you could answer my question briefly since I know we don't have much time now.

In addition, I would like to ask the theologians present about the meaning of death described in Genesis where God said "You are going to die" when Adam and Eve ate the fruits which God forbade them to eat. Apparently the death here meant a spiritual death by "separation from God," but physically they continued to live for quite a while. I wonder what happened with Adam and Eve in terms of their genetic changes which led to physical death. My understanding is that this death coming from sin indicates both physical and spiritual death. I wonder whether if you can comment briefly on this.

Bob White: Well I think we'll give Sarah the last word on death and then we'll finish formally so that people can leave.

Sarah Coakley: Well, I wouldn't myself take a literal reading of Genesis, but that's another discussion. However, having been a hospital chaplain at one point and witnessed many deaths, I would want to say that the spiritual condition of people when they die strongly affects the way they die and therefore your instinct that physical death and other factors such as sin or lack of sin are deeply, deeply implicated with one another.

On the first point of forgiveness, what Martin Nowack means by forgiveness is for me a somewhat partial notion of forgiveness because it's sort of passing over a defection wound, as it were for, the sake of going on with the game. And I don't think that's a sufficiently robust notion of forgiveness. Nevertheless, it is rather interesting that that is a winning strategy, according to his latest work, so people who are capable of not wasting energy going out to punish people do better in the long term and I think we all know this actually in human terms. To be able to show it in evolutionary terms, is very, very interesting. Either they want to add a great deal more about richly theological notions of forgiveness and, having indeed written on that, I think there's a sense for those who believe in God that true forgiveness in its fully theological meaning is done by God in us, rather than done by us. It's a cooperative event with God, and of course both Christian and Jewish literatures witness to that.

Bob White: Sarah, thank you very much.

Who's Who

Prof Sarah Coakley, Norris-Hulse Professor, Faculty of Divinity, and Fellow of Murray-Edwards College; co-director, with Martin A. Nowak (Harvard University) of the 'Evolution and the Theology of Cooperation' project at Harvard, 2005-8, and co-editor with Nowak of the forthcoming *Evolution, Games and God: The Principle of Cooperation* (Harvard UP). Co-editor of *Pain and Its Transformations: The Interface of Biology and Culture* (Harvard UP, 2007), and author of several other books on systematic theology, philosophical theology, and patristics, including *Powers and Submissions: Philosophy, Spirituality and Gender* (Blackwell, 2001).

Dr Denis Alexander, Director of the Faraday Institute and Fellow of St. Edmund's College, engaged in cancer and immunology research at the Babraham Institute; Editor of the journal *Science & Christian Belief*, author of *Rebuilding the Matrix* (2001, Lion), *Creation or Evolution - Do We Have To Choose?* (2008, Monarch) and (with Bob White) of *Beyond Belief - Science, Faith and Ethical Challenges* (2004, Lion).

Tim Clutton-Brock is the Prince Philip Professor of Ecology and Evolutionary Biology at the University of Cambridge. His research has investigated the evolution of reproductive strategies, breeding systems and societies, the operation of natural and sexual selection and the regulation of animal populations. He has worked primarily with mammals including red deer (on Rum), Soay sheep (on St Kilda) and meerkats (in the Kalahari). His current research focuses on the evolutionary causes and ecological consequences of cooperative breeding in animal societies.

Prof Derek Burke, Honorary Fellow of St Edmund's, a former Vice-Chancellor of the University of East Anglia, a former Chairman of the Advisory Committee on Novel Foods and Processes, a former Specialist Adviser to the House of Commons Science and Technology Committee and a member of the Bioscience for Society Panel of the BBSRC.

Revd Dr Geoffrey Cook, Life Fellow and former Vice-Master, St Edmund's College and Affiliated Lecturer, Department of Physiology, Development and Neuroscience, where his research is in developmental neurobiology. Ordained as a deacon of the Catholic Church, he chairs the Diocesan Commission for Dialogue & Unity, RC Diocese of East Anglia.

Henry Disney followed a career in the army by studying Zoology at Cambridge. This led to running field study centres in the UK and then significant work as a medical entomologist in Belize and Cameroon. Since 'retirement' he has continued his entomological research as a world specialist on scuttle flies (Phoridae). He was awarded a PhD by the University of Cambridge for his 1960's publications (on medical entomology) and a ScD for subsequent publications. In addition to his scientific publications he is also a published poet.

Professor David Ford is the Regius Professor of Divinity at Cambridge and a fellow of Selwyn College. His current research interests are in the area of contemporary Christian thought with a focus on hermeneutics, the interpretation of scripture and substantive issues in contemporary Christian thought and practice and on aspects of inter-faith theology. Other research interests include theology and religious studies within universities and political and ecumenical theology

Prof Sir Brian Heap CBE ScD FRS, Research Associate, Capability and Sustainability Centre. Formerly Master, St Edmund's College and Vice-president and Foreign Secretary of the Royal Society, and editor of 'Philosophical Transactions of the Royal Society (biological sciences)'.

Revd Dr Rodney Holder, Course Director of the Faraday Institute, former Priest in Charge of the Parish of the Claydons, Diocese of Oxford; author of *God, the Multiverse, and Everything: Modern Cosmology and the Argument from Design* (Ashgate, 2004) and *Nothing But Atoms and Molecules?* (republished 2008).

Prof. Barry Keverne D.Sc F.Med.Sci FRS, Director of the Sub-Department of Animal Behaviour and Fellow of King's College. Professor of Behavioural Neuroscience with particular interests in brain evolution.

Timothy Jenkins, Assistant Director of Research in the Faculty of Theology & Religious Studies and Dean & Fellow of Jesus College; author of *Religion in English Everyday Life* (Berghahn, 1999), *An Experiment in Providence* (SPCK, 2006), and *From Le Play to Bourdieu: the Life of Property in Béarn* (Berghahn, forthcoming).

Dr Russell Re Manning is a University Lecturer in Philosophy of Religion at the Faculty of Divinity and Fellow of St Edmund's College, Cambridge. His research focuses on issues in natural theology, the thought of Paul Tillich and the philosophy of religion. Publications include, *Theology at the End of Culture* (Peeters, 2005), *The Cambridge Companion to Paul Tillich* (CUP, 2008), and *The Oxford Handbook of Natural Theology* (OUP, 2011).

Dr Hilary Marlow. Research Associate at the Faraday Institute and member of St Edmund's College; affiliated lecturer Faculty of Divinity. Research interests: religious motivations for environmental concern; the Old Testament and environmental ethics; status and role of humanity in the biblical tradition;

Dr Graham Murray is a consultant psychiatrist and MRC Clinician Scientist at the Department of Psychiatry and Behavioural and Clinical Neuroscience Institute. His research interests include cognitive and emotional neuroscience, and the biology of psychiatric symptoms.

[The Rev'd] George Pitcher - Religion Editor of Telegraph Media (Daily, Sunday and telegraph.co.uk). Co-founder and former chief executive of communications consultancy Luther Pendragon. Author of *The Death of Spin* (Wiley, 2002). Recently completed curacy and now associate priest at St Bride's, Fleet Street, the "journalists' church".

Revd Dr John Polkinghorne KBE FRS, Retired president of Queens' college and formerly Professor of Mathematical Physics (elementary particle physics). Author of many books on science and religion. In 2002 awarded a Templeton Prize.

Dr Janet Martin Soskice is University Reader in Philosophical Theology, a Fellow of Jesus College, a past-President of the Catholic Theological Association of Great Britain and President-elect of the Society for the Study of Theology. She is the author of *Metaphor and Religious Language* (O.U.P. 1984) and *The Kindness of God* (OUP, 2008) and has edited *Medicine and Moral Reasoning* with Grant Gillett and K.W. Fulford (C.U.P., 1994) and, with Diana Lipton, *Feminism and Theology* (OUP, 2003). She is currently editing a volume of the papers of a Vatican Observatory conference on creatio ex nihilo in the Abrahamic faiths.

Professor Ming T Tsuang, Behavioral Genomics Endowed Chair and Distinguished Professor of Psychiatry, University of California, San Diego; Director, Harvard Institute of Psychiatric Epidemiology & Genetics, Harvard Medical School and Harvard School of Public Health. He is Senior Editor of *Neuropsychiatric Genetics* and author of publications in genetics epidemiology, spirituality and health, and twin studies on spirituality and mental health.

Prof Bob White FRS, Associate Director of the Faraday Institute and Fellow of St. Edmund's College; Dept of Earth Sciences; volcanoes, earthquakes, climate change and other catastrophes; co-author of *Beyond Belief – Science, Faith and Ethical Challenges* (Lion, 2004) and *Christianity, Climate Change and Sustainable Living* (SPCK, 2007).