

The Science and Religion Dialogue: Why It Matters
ISSR – Boston, MA
Sunday, August 19, 2004 @ 8:00 p.m.

Moderator: Ladies and gentlemen... my name is Owen Gingerich, I am Research Professor of Astronomy and History of Science at the Harvard Smithsonian Center for Astrophysics. And it's my pleasant opportunity to welcome you tonight to what promises to be a very... a special kind of occasion.

Many of you are looking at the signs and you're wondering what I-S-S-R stands for. You may read it in the front here as the International Society for Science and Religion. If you've never heard of it, that's all right. It's a relatively new organization that has one hundred and eight members of specialists who are particularly interested in the science and religion dialogue.

Tonight's lecture is being videotaped; it will be Web-cast on WGBH Forum Network at www.wgbh.org/forum.

What we have here tonight are four of the Templeton Prize Winners. The Templeton Prize is the largest prize monetarily that is given to individuals. Three of our panelists are here on the stage, but I do want to recognize a fourth Templeton Prize Winner... Ian Barbour. Ian, will you stand up?

[Applause]

I would also like to recognize Dr. John Templeton, Jr., who is the President of The Templeton Foundation, and he's also here with us.

[Applause]

The topic tonight is The Science Religion Dialogue: Why it Matters. And we have three extraordinary panelists to discuss this topic. The major presentation will be brought to us by George Ellis. And then there will be shorter commentaries afterwards by John Polkinghorne and by Holmes Rolston.

So let me begin by telling you something about George Ellis, who won the Templeton Prize this very year. He was born in Johannesburg, South Africa. He studied at Cambridge University where he received his Ph.D. in applied maths and theoretical physics in 1964. In 1973 he co-wrote *The Large Scale Structure of Space Time* with Stephen Hawking, debuting at a strategic moment in the development of general relativity theory, which is Ellis's specific area of expertise. And soon his book became a standard reference. It's still in print, there were copies being sold outside the door outside tonight.

The book's condensed approach to difficult topics ranging from classical relatively theory to the nature of black holes have led students to refer to it as the "Yellow Peril."

The year after writing that, he returned to South Africa to accept an appointment as Professor of Applied Mathematics at The University of Cape Town, a position that he continues to hold. Coming into South Africa also brought Ellis back face to face with the apartheid system. Though his parents were atheists, he grew up immersed in the youth activities of the Anglican Church. And by the time he returned to South Africa in 1974, however, the injustice of the political system helped drive him to the Society of Friends. "I found Quakers more to my taste," he's written, "liking the mixture of spiritual awareness and social activism, the lack of creeds combined with the basis of silence in the meeting for worship."

His activism found an outlet in 1977 when he and three colleagues released *The Squatter Problem in the Western Cape*, a plea for the rights of homeless people and for new social policy to help them. This and a sequel book later helped influence a renewed national housing policy there.

With a fervor equal to his social work, Ellis has also pursued cosmological inquiries, writing a series of distinguished books, articles, and lectures. During those years he also distinguished himself by moving to bring the forces of science and religion together to the general benefit of both fields. His efforts to balance the rationality of evidence based science with faith and hope has made him a key figure in the discussion of the boundaries of science and theology. By his ongoing efforts in both camps, in 2002 he edited *The Far-Future Universe*, proceedings of a symposium on eschatology held at the Pontifical Academy in the Vatican, and he wrote *The Universe Around Us: An Integrative View of Science and Cosmology*.

He's written with Nancey Murphy, who I suppose in the audience tonight, *On the Moral Nature of the Universe: Cosmology, Theology, and Ethics*, a discussion of the ethical underpinnings of the universe, one that specifically holds that the moral basis of ethics is the self-sacrificing love known as kenotics.

He's a devotee of the outdoors – hiking, mountain climbing, almost every weekend, and sometimes assisting in rescue missions. And when he retires later this year he hopes to train in helicopter flying. I'm not going to tell you anything more about him; I don't want to take all his time. George...

[Applause]

George Ellis: Thank you very much for that warm welcome and introduction, and it's a privilege to be here with you all, I'm delighted by this audience which has what interest there is in this topic. So I've got the lead position and what I want to talk about is the benefits of the science and religion dialogue. And I want to say that it provides benefits both ways. It provides benefits from religion to science and from science to religion, and I will try to talk about both of these benefits.

This is possible provided we talk about the... [microphone feedback...]

Moderator: Are you turned on?

[Laughter]

George Ellis: I am turned on... The dialogue of science and religion can take place between the non...

[Audience reaction... sound problems being rectified...]

Use this one instead? Okay... The science and religion dialogue can take place between the non-fundamentalist wings of science and the non-fundamentalist wings of religion. And I will talk about fundamentalism a little bit later. It's not easy to enter into dialogue with those who have no doubt that they have attained the truth and they believe that they have attained perfect knowledge. One has to enter the dialogue with people who are open to new visions and new understandings.

The dialogue is important because at issue is the way we understand ultimate reality – the very nature of existence. And that plays a crucial role in how we see ourselves and the meaning in our lives. The way we see ourselves as human beings depends on our understanding of the nature of existence. Now, a primary issue is the tensions experienced by religion in the face of the sweep of understanding given to us by modern science.

And this, as you well all know, has undermined the faith of many believers through the past centuries as science has risen it has, in many cases, undermined the faith of believers. The science and religion dialogue can help in developing mature religious understandings that will be robust in the face of scientific modern discoveries. And indeed this is its core project, which has implications both ways.

Firstly, I want to talk about from science to religion. Now one of the problems on the religious side in the past has been the issue of religious dogmatism in hubris. The tendency on the religious side to claim absolute truth. What for what are in fact are fallible disbeliefs. And we know they are fallible for the simple reason that we can point to many religious believers of different faiths who hold different religious beliefs, and they can't all be correct in some sense or other. They will, in fact, can be correct in a deeper kind of sense, but if you take the fundamentalist views of those religions, they are at odds with each other.

Now the scientific approach can temper this tendency to claim infallibility for religious beliefs. When these are attempts to capture in human words a transcendent nature of existence. And that clearly is a very perilous project, because the attempt to capture the transcendent in words, which are based on our human experience, is bound to be a difficult enterprise.

What the science and religion dialogue can do is to help religious understanding relate

more coherently to the impedance which supports faith. And crucial to science and religion is the issue of discernment. Discernment is the ways of testing knowledge and beliefs. When you have a belief which you hold very very strongly there's still the question in both cases is – How do you discern its validity? How do you test whether it's actually something which you should hold to or something you should let go of?

In many ways, as many people have said, including my colleague Nancey Murphy, the kinds of methodology one can use in science and religion can be very similar in the sense that one bases one's belief on data, on evidence, which you get. But the data is very different. In religion what matters very often is individual events and specific things that happen – specific experiences in your own life. Where as science is concerned with what is repeatable, what is reliably repeatable under controlled conditions.

And these differences in the kinds of data make for very different outcomes. But what one is looking for, never the less, in both religion and in science, is consistency of understanding compatibility with data, consensus of a community who have a common understanding, testing it by the knowledge of experts – people who have very deep experience, and in particular, testing one's theories by the results that they produce.

And in doing so, one sees that it is a mistake from the religious side to try to make claims of a scientific nature. And we all know about that kind of argument where people try to produce various religious tenants and treat them as if they were scientific treatises, when this is not what they were intended to be.

So, from science to religion, science can help in understanding how to evaluate evidence, how to test theories in the face of experience, and how to try to eliminate self-deception. There are religious ways of doing it; this project of discernment is also very deeply embedded in many religious traditions.

Science in one particular thing, which I think is helpful, is science can help in understanding of the multiple ways that a single reality can be represented and understood. I have just been reading Roger Penrose's magnificent new book called – *The Road to Reality*, which is a survey of mathematics and physics in a thousand pages, which summarizes present day knowledge of fundamental physics and the mathematics which underlies it. And it becomes very clear in this book of Roger's how both in mathematics and physics there can be entities – in the case of mathematics platonic entities perhaps, which can be viewed in a great many different kinds of ways. And you get different images, which are all valid, of the same underlying reality. Now that is a very serious model of how one can try to view the way that multiple faiths can relate to a single kind of underlying religious reality.

So these kinds of things, and particularly I think in a sense the way that one is open to evidence, one is open to new understandings is an important contribution which science can make to religious understanding, and in particular to the inter-faith dialogue which is taking place at the present time, and which I will say a little more about in a while.

From religion to science one might think there isn't very much that can be given from the

religious to the scientific side, but actually religion can give a great deal to science, and this is really quite important. The problem here is on the scientific side we also face dogmatism and hubris. In particular there has been in recent years a resulting denial of human nature in many of the human sciences and neurosciences. And this is really a very important kind of thing which needs to be looked at. At issue in this case is how we view ourselves in terms of what is the core of humanity? What is the center of the nature of human beings?

Crucial consequences follow for how we treat people individually, medically, politically... and as an example of this, in the case of psychology, I'm going to quote from Steven Pinker's book *The Blank Slate*, which talks about a lot of this in a very illuminating and important way. He talks about behaviorism. According to Pinker, in behaviorism there was no such thing as a talent or an ability. Watson had bound them from psychology together with the contents of the mind, such ideas, beliefs, desires, and feelings. To a behaviorist the only legitimate topic for psychology is overt behavior and how it is controlled by the past and present environment. Behaviorists believe that behavior could be understood independently of the rest of biology without attention to the genetic makeup of the animal or the evolutionary history of the species.

So why does it matter that people have that kind of view? The reason is because in *The Behavior of Organisms*, Skinner... written by Skinner, the only organisms considered were rats and pigeons, and on that basis the behavior is recommended how one should treat human beings. Watson wrote an influential child-rearing manual recommending the parents establish rigid feeding schedules for their children and give them a minimum of attention and love.

So these kinds of views from psychologists, which dehumanize human beings, resulted in children being denied the affection, which is crucial to their growing up in a happy way and developing as full human beings.

So this is old hat you say, there aren't many behaviorists left nowadays so why does that matter? On the contrary. Present day neuroscience is in exactly the same danger or resulting in exactly the same kind of approach to human beings. I'm going to quote – several quotations from a book by Merlin Donald called *A Mind So Rare*, which I highly recommend on this debate. He's talking about present day neuroscientists, and I'm going to give several quotes.

He says “Hard-liners led by a vanguard of rather voluble philosophers believe not merely that consciousness is limited, as experimentalists have been saying for years, but that it plays no significant role in human cognition. They believe that we think, speak and remember entirely outside its influence. Moreover, the use of the term consciousness is viewed as pernicious because note the theological undertones, it leads us into error. They support the downgrading of consciousness to the status of an epiphenomenon, a secondary by product of the brain's activities, a superficial manifestation of mental activity that plays no role in cognition.”

Now you may never read some of this stuff, but this is an accurate representation of a

substantial school of neuroscience at the present day.

Donald is actually denying the biological reality of the self. “Selves,” he says, “and self consciousness are cultural inventions. The initiation and execution of mental activity is always outside conscious control. Consciousness is an illusion and we do not exist in any meaningful sense. But they apologize at great length; this daunting fact does not matter. Life will go on as always, meaningless algorithm after meaningless algorithm and we can all return to our lives as if nothing has happened. This is rather like telling you your real parents were not the ones you grew to know and love, but Jack the Ripper and Ilsa the She Wolf of the SS, but not to worry.”

[Laughter]

If you really take this seriously it has a devastating effect of dehumanizing psychological and philosophical views of humanity. And Merlin Donald writes, “The practical consequences of this deterministic crusade are terrible indeed. There is no sound biological or ideological basis for self will, willpower, freedom or responsibility. Then notion of the conscious life is a vacuum that leaves us with an idea of the self that is arbitrary, relative and much worse – totally empty, because it is not really a conscious self, at least not in any important way.”

And this is a tendency at the present time, in neuroscience, now I'm not saying all of neuroscience is like that, but as he says, some very voluble and prominent people in the neuroscience community are putting this view of humanity across.

And that is what we have to work against in the science and religious... the influence of religion on science can be part of the response against this kind of dehumanizing view of the nature of humanity.

There's a need for the more humanist views to counter against scientific fundamentalism of this kind and the associated absolutist views. And I want to emphasize again that these kinds of views have consequences because they are taken seriously by some people on the medical side and are used as the basis of some recommendations of medical treatment. So they really do have important consequences. So in this case, the view... the importing the religious views, which takes full humanity seriously, is really a significant part of countering this kind of view.

One further thing in which religion can help in the scientific domain is as follows: Scientific programs are decided on the basis of what people think is a valuable project to look at. And the results of the program will never depend on the motivation, which led to it. Because once you've started a scientific program it is led by its own scientific imperatives. You start looking at the mind and you follow where that leads. But deciding what is important to do is where decisions which involve ethics, and all sorts of kind of things coming, and the science... what the science and religion debate can do is help decide which projects on the scientific side are worth pursuing. In my own case I have had a huge benefit from taking part in the science and religion debate because it has got me into a whole project to try to understand the origin of complexity out of the

physics of the way that the mind works. And so and I would have never got into this whole project if it hadn't been for working in the science and religion area.

So this debate can be a good force in the development of truly multi-disciplinary studies. One of the things, we've been taking part with many of the people in this room is a ten-year project initiated by the Vatican Observatory together with the Center for Theology and Natural Sciences in Berkeley. And this has been a really amazing project in which the five volumes have covered. First, the quantum cosmology and the creation of the universe. Second, the chaos and complexity. Thirdly, the evolutionary biology. Fourthly, the nature of the mind. And fifthly, the quantum theory. And these have all been put together in a series of volumes which have come out of this.

The people taking part in this, and they're very very fine people who have been taking part who have got degrees in... multiple degrees in philosophy, in religion, in science, have all, through this, learned about each of these areas and try to integrate all of those areas with religious viewpoint of the way the world is constructed. Now that is a truly remarkable development, to have that kind of inter-disciplinary integration taking place. And this has happened as a result of the science and religion dialogue. In fact, it's extraordinary now how people from theology... from the theology side, are writing very serious text relating to neuroscience, because the neuroscience issues I've just been indicating is one of the core issues here.

There's a great tendency in academia to split up topics, create fences and defenses defending different topics from each other. And people sort of taking their academic turf and knocking it off and trying to keep other out. And this kind of inter-disciplinary debate, which the science and religion dialogue has encouraged, is a really... it's a really vital and encouraging thing to see that taking place.

So, overall the science dialogue can help religion to withstand the blasts of scientific dogmatism and to see the true roles of faith and hope, emotion and ethics, as well as a rationality. There's this kind of vision from the scientific side, as well as from some philosophers, that only human rationality is what's needed in order to understand the world around us. And in order to live our own lives, indeed, it's become a kind of management model for example. But rationality is very limited in what it can do. In fact, in real daily life, we have rationality and we have faith and hope. We never have enough knowledge to conduct our affairs on a purely rational basis. There never is enough evidence. And so we have to mix in faith and hope in daily decisions, small ones and big ones, the kinds of decisions like who your life partner will be. The decisions where you're going to live, what drugs you're going to take and so on and so on. They're all influenced, not just by rationality, but also by faith and hope because you never have enough data to work them out in a purely rational way.

But feeding it from below is emotion. Emotional issues are really important in the way the mind functions and how we decide what we're going to do. But that is balanced from above by ethical values coming in. And the full scheme is not just rationality, as science might have us believe, or at least some views of science, in order to live a full human life what we're going to be doing, we're going to have our emotions coming up from below suggesting what we should be doing. Our values coming from on top, in many cases

contradicting what the emotion is saying. Our rational self mediating between the two, and often having to call on faith and hope in order to make decisions in the case of not enough information.

And so this is the whole context in which we have to be working. Not purely the kind of rational view of the world that you might sometimes believe from reading books about science.

In doing this balancing act between rationality and faith and hope you run against a kind of a paradox. Because not all faiths are equally good faiths. Not all hopes are equally good hopes. There's the kind of paradox of justified faiths and reasonable hopes. And I came across this particularly by reading about the last days of Adolph Hitler in his bunker in Berlin, when he had this hope that the Allied Armies would be destroyed by his German Army, even though they were at the last legs, they had no resources left. And this was an example of an evil hope. And so part of what is needed in all of this is the ability to try to take a look at what is good hopes, what is justifiable faiths. And this is very very much dependent on their ethical outcomes, and so they have to be balanced against ethical issues.

And this applies also to public policy and applied science, the issue of ethics comes in, the issue of values. And this is one of the really important things, which the science and religion debate can help in the case of science, is to understand the issue of values. Because all applied sciences impact lives in very important ways. There are these major public issues which are coming up all the time – biotechnology issues, issues of cloning, values in environmental decisions, global warming, genetically modified foods, nuclear power, and so on.

Now in many of these issues there's a public debate which to a considerable extent is characterized by irrationality. And the scientific input is extremely important to try to give a rational analysis of each of these issues to see really what the scientific issues are. But by itself the scientific issues alone simply don't decide it. Because the decisions we make are based on a value system which governs what is, in the end, what we should choose to do and what not in the public domain as well as in the private domain. Wise input is needed in these areas. And particularly, of course, this is true in medicine. Issues such as the prolongation of life, and in the future one of the really big crunch areas is going to be issues related to the brain. We're obtaining this incredible new understanding of the way that the brain works, how the mind relates to the brain, through all of the technologies – imaging technologies, and all sorts of kinds of things. As we obtain more and more understanding of the brain works, we are going to be more and more tempted to interfere with the way people's minds works in all sorts of ways if we have the vision of how they should be working, which we don't lack, there is this temptation to use our knowledge about the way the mind works in order to control people's minds. And this is going to become more and more of a temptation in the coming decades.

These kinds of ethical issues need crucially values that will guide our decisions. Now it is really important here, science cannot provide values. This is something some scientists really are confused about in my opinion, and it's really crucial. What some scientists say

is – Look, sociobiology tells us the origin of values. Evolutionary psychology can tell you where values come from. This is absolutely incorrect. What those subjects will tell you is what people tend to do. It cannot tell you if what they are doing is right or is wrong, is good or is evil. Good and evil are not scientific categories. And in this issue of values... so the one view which many people have is that the social biology, evolutionary psychology, can provide those values. The people who have said that haven't through it through properly. And when they say that, nowadays I try to get them to face up to the real issues by saying – Fine, if science can provide values through these kinds of analyses, tell me what those analyses said should have been done in Iraq. And you get then this sort of stunned look, because they haven't actually tried to relate their theories to the reality of political decisions, which have to be taken in the world at the present time.

They use the countervailing view from some of the human sciences that values come from society – it's all a social thing to do with culture. Culture is the source of values. And of course if you believe that, you are sunk in relativism and you are not able to say that any act is evil or indeed that any act is good. All you can say is someone was brought up in a different culture, and therefore they behave in a different way. It's crucially important of the application of science, public policy, and in applied science, that values have to come from some philosophical or religious standpoint. And this is where the science and religion dialogue can take an important part.

We need to take the values which our various religions provide us with, the major world religions, try and see if there is a common core in those values which can be provided by the religions in some interfaith dialogue to the public at large. And, indeed, I strongly believe that there is such a common core, which is agreed on at a deep level by the non-fundamentalist wings of all the religious faiths. And this is what was mentioned briefly in the introduction, the idea of kenosis, or self-sacrifice of self-emptying, is the deep core, which I believe is commonly agreed in all of the great world religions. And I have a lot of evidence to back that up which comes from the science and religion dialogue. The many interactions I've had with Christians, Muslims, Jews and people of the other faiths. And in fact, this is also backed up by Sir John Templeton's book about Agape Love, which talks about this in a very very nice way.

So what there is is a need in public debate for an input on the nature of values which is underlying environmental decisions and public decisions. And this is where the science and religion dialogue has not yet played a part. But it has the potential to play a really important part by setting up panels who would give advice on this to governments, to the United Nations, to countries.

We've been discussing this in the executive committee of the society – in what kind of way should this take place? And it's very... and one has to be very cautious about this, about not jumping in and making sort of decisions... or statements which won't have any real practical impact. But what I believe can be done here is to look at issues where science plays a role, such as some of the ones I've mentioned – cloning, GM foods and so... to try to get clarity on the scientific issues. But scientists by themselves can't help make the real decisions that need to be made because they don't, as I've just been saying, have that ethical basis. They don't have stated ethical value system or grounds for values,

and this is where the religious sides come in. And there is the prospect of an interfaith dialogue taking place in which one looks at these kinds of issues with non-fundamentalist representatives of all of the world religions and tries to bring forward to decision makers, not necessarily a recommendation of what policy they should make, but very clear statements of the scientific implications and the ethical implications of each of the choices before them, and thereby helping public decision making at the national and international level to take place at a better and deeper level than at the present time.

Neither scientists by themselves, nor religious people like themselves can do it, but it's the inter mixing in these issues where values matter, but scientific issues matter, where this debate can play a really important part. And allowing this proposal is a core belief that the spiritual wings of the great world religions have a common core of ethical values that can be used to provide guidance in practical situations. Enough said, I believe that that is that case. Deep values will start with an appreciation and support of the idea of a common humanity, the common good going on to deeper attempts to look at empathy with others, going on to the issues of forgiveness, which is crucial in many public political issues, and ultimately self-sacrifice or kenosis, self-emptying.

Now these deeper domains of ethics will not be practical policies in the world at this time for much of the international policy. Nevertheless there are practical policies that move actions towards those directions, influence the way the policy is towards those kind of deep ethics. And I think that the religious community can make an input to those values in a sensible and important way.

Elements of kenosis of giving up on behalf of others occurs in taking future generations into account and taking other countries into account into issues such as water pollution, resource uses, and so on. And it's made practical by policies that hand over some national sovereignty in these issues to international bodies. For instance, global warming – handing over power to deal with issues of global warming to an international body instead of leaving it in the domain of sovereign states.

At the more local level, the science and religion debate can help on issues of national policy or local policy, such as the issue – teaching evolution in schools, that's the kind of thing which this society can make some comment on. But other issues such as the effect of violence in television, films, and video games on children – it's the kind of issue where we could take a stand and try to influence policy.

Now, in all of these issues the crucial battle is against all the fundamentalisms that deny the multi-factual nature of causality and existence. Fundamentalisms that elevate some simplistic explanatory scheme that the proponents happen to be experting over all other considerations without taking context into account. By fundamentalism I here mean a partial truth which is proclaimed as a whole truth. And if you think back to all of those examples from the human science, you will see that this is what underlies them.

What people have been proposing is a truth, but it's a partial truth. And the problem comes when it's claimed to be the whole truth.

The science and religion dialogue can help fight dogmatism across the board by bringing broadly scientific criteria into the search for truth. That insisting on this integrated view, not denying the breadth of human evidence and the need for faith and hope as well as rationality. I see fundamentalism as a problem in all areas – in arts, literature, religion, science – including the human sciences. And it's one of the oldest human tendencies to claim that bit which we can see is the whole truth. And what other people therefore say has no value.

So I want to quote from Sir Isaiah Berlin. “Few things have done more harm than the belief on the part of individuals or groups or tribes or states or nations or churches, that he or she or they are in sole possession of the truth. Especially about how to live, what to be and to do. And that those who differ from them are not merely mistaken but wicked or mad and need restraining or suppressing. It is a terrible and dangerous arrogance to believe that you alone are right. You alone have a magical eye which sees the truth and that others cannot be right if they disagree.”

Now in principal a scientific method is the opposite of that. In practice it doesn't always work out that way. In principal this has been... this should not be what religious truth is about either. At least when you start getting involved in the interfaith dialogue, which is taking off at the present time in such an important way. And I believe the science and religion dialogue can promote a constructive interaction of very different worldviews that are attempts to view important aspects of the same underlying reality through different spectacles. It can emphasize humility in doing so. Humility in looking at the scientific issues and the religious issues and how they relate to each other.

The essential issue is a kenotic one, a self emptying one, giving up the claim to be right in favor of trying to see what is actually there from as many different viewpoints as possible. Respecting alternative viewpoints put forward by others, but all the time keeping in mind the need for evidence and testing of theory being aware of the dangers of self-delusion.

And so I think that the... looking at science and religion, trying to fit them together, look at this big scene with this kind of open-minded attitude, can help all around in reducing fundamentalism and promoting dialogue between all these different areas.

It can help in developing worldviews that can accommodate the pragmatic nature of science, but also the kinds of deeper issues regarding existence and meaning that can be encountered in spiritual and religious worldviews. Thus it can explore the deep nature of reality by taking all of these things into account. Not denying the value of some of them, as so often happens.

What is important here is seeing the proper domains of each subject and the limitations of those proper domains, the limits to science and the limits to religion as well as the achievements of science and the achievements of religion. And in this I think it's really important that looking at science from this broader viewpoint, one can see very clearly that science cannot deal with aesthetics, with ethics, which I have talked a bit about, with metaphysics, and with meaning. These four areas – ethics, aesthetics, metaphysics, and

meaning – are outside the domain of competence of science. Not only now, but forever. Because the scientific method cannot deal with them. And the kind of example I like to use here is in terms of aesthetics, for instance. The idea that this scientist will emerge from his laboratory with this meter and he'll come to you and say – Look, you point this at a picture, you press a button, it will tell you how beautiful the picture is. Okay?

[Laughter]

You press the button and it says – ten million Rembrandts. This is a kind of example of the misuse of science by trying to use it outside its domain. And the dialogue of science and religion helps very clearly to see – what is the proper domain of science? Also, of course, of religion, that you shouldn't take very seriously a religious statement about, for instance, the first ten microseconds of the history of the universe. Because religion simply doesn't have the investigative capacity to look at such issues. And the religious text should not be taken as scientific text. And so what is really important here is this way that this dialogue helps integrate things, but to see the boundaries of what each topic can properly handle.

In doing so, what one has to do is understand context where each kind of argument or consideration is appropriate and when different other approaches are appropriate. When is the religious view the one which one should be using? The scientific view? Some combined kind of view? It's a question of context.

I do believe in particular that this whole dialogue is a good ground for interfaith understanding. If you try to get different faiths together and talk about faith fundamentals, often a good will attempt to increase understanding will actually result in greater disagreement. Because you sort of go head on at the fundamentals which you disagree about. But if you bring together different faith groups and say – Let's talk about scientific issues, about the scientific view of the history of the universe, or the history of evolution of the nature of human beings – you can often get a great deal of agreement. And in fact this is what this society is about. We do have members from all the major traditions and we are having very interesting discussions in which we are looking at scientific issues and thereby, indirectly, facilitating an inter-religious interfaith dialogue, which is a really important part of that dialogue which is taking place at the present time.

In these ways one is helping to see what is fundamentally important but often taken for granted. One of the reasons that fundamentalism goes wrong is because it takes for granted various things which are really important. For instance, the kind of claim that the mind is an epiphenomenon, which I was quoting for you earlier, if you really take that seriously you have no reason to believe the beliefs of anybody who takes that view seriously. Because you say to them – Look, you're producing these statements for me, but you have just said your mind is an epiphenomenon, so why should I believe any arguments you bring forth? Because they are not rational arguments, they are coming out of the unconscious through these mechanisms you've been talking about.

So overall, I believe that the science and religion dialogue can be important in emphasizing all the dimensions of humanity and the crucial value... the crucial role of

ethical value systems which cannot be derived from science alone. It has the potential to provide a deeper and more profound concilliance between the different worldviews, the different subjects, that is impossible any other way because it can probe root causes which are beyond the nature of science – that's the issue of metaphysics, and it can probe issues of meaning in a way that science by itself cannot do.

The dialogue can link science to ethics and meaning, or telos and even to aesthetics, provided you set out with the aim of linking them in a way which doesn't undermine any of them. In doing this it can keep alive an awareness of the spiritual dimension of life in the face of scientific certainties. Because those scientific certainties are retained by restricting your viewpoint. And they're very important certainties but they are retained by a restriction of viewpoint to the strictly repeatable experiments that can be carried out under highly restricted laboratory circumstances.

It is possible, and most of the people in this group, are succeeding in integrating from each of their viewpoints, faith and science, in a way which deepens wonder and awe as we appreciate the mechanisms by which our life has been created and supported and the mechanisms which underlie the way that human bodies and human minds function. And in the end, I would suggest that this is indeed the true nature of spirituality. Spirituality is being profoundly aware of all of these dimensions of existence. Trying to see how they all fit together. Because, of course, if you are a scientist who believes in God, then one of the things is, as in the old days, understanding science is understanding an aspect of the mind of God. You've heard that phrase because God is the creator of physics, of chemistry, of biology, and so understanding each of those subjects is indeed, as many have said, a way of understanding the mind of God.

So being profoundly aware of all of these dimensions of existence, the scientific, the aesthetic, the ethical... appreciating all of their interconnections, replacing the nothing better reductionism by wonder, reverence and awe, that is what this whole interaction and debate is all about. It can be an important integrator factor in helping all of humanity in the way we see ourselves and the way we see the universe in which we live. This affects our quality of live in a crucial way because it helps us to be fully human.

[Applause]

Moderator: Thank you very much, George. You members of the audience will have a chance at the end of the other panelists to address questions to the various members.

In introducing George Ellis, I forgot to mention that just this afternoon he became President of the International Society for the Study of Science and Religion.

[Applause]

And now I am about to introduce to you the founding President of the International Society of Science and Religion, Rev. Dr. Sir John Polkinghorne. He's a mathematical physicist, and I think still the only ordained member of the Royal Society. His treatment of theology as a natural science has invigorated the search for the interface between

science and religion made him a leading figure in this emerging field. And as a result he was the Templeton Prize Winner for progress in religion and understanding of theology and science and religion in 2002.

In 1979 he shocked his colleagues by resigning a prestigious position as Professor of Mathematical Physics at the University of Cambridge in order to pursue theological studies, becoming an Anglican priest in 1982. He subsequently served as a curate and vicar in various locales, became Dean and Chaplain at Trinity Hall, Cambridge. And then in 1989 he was offered the position of President of Queen's College, Cambridge. "You could have knocked me over with a feather" was his comment.

In England he has chaired various commissions dealing with social responsibility, genetic testing and human cloning. And here in New England he's been the Nobel lecturer at Harvard's Memorial Church.

During the period when he was doing all of these things he published a series of books exploring and developing aspects of the compatibility of religion and science. These began with *The Way the World Is*, quote – what I would have liked to have said to my scientific colleagues who couldn't understand why I was being ordained, unquote. And in a trilogy, *One World, Science and Creation*, and *Science and Providence*. And as I indicated he won the Templeton Prize for Science and Religion in 2002 and in that very same year became the founding President of the International Society for Science and Religion.

When he was asked if his exacting scientific background makes him scornful of the vagaries of theology he responded, "Far from it. Theology is much more difficult. Physics, at least at the undergraduate level, is a subject on which the dust has settled. In Theology the dust never settles." John...

[Applause]

John Polkinghorne: Well thank you, Owen. Can I first of all ask – Do I need to switch on my radio mic, or do I just rely on this? Somebody tell me.

Audience: Mic...

John Polkinghorne: That one, okay. Let's do that one, right, let's do that one...

Well... our visitors here are here for this meeting on science and religion, and I understand the topic for the evening is – Why does science and religion matter? And in order to address that, I'd like to ask first of all... but might seem a simpler or more straight forward question which is, Why does science matter?

You might think, okay science matters because if we didn't have science we wouldn't have refrigerators and television sets...

[Laughter]

But that's to confuse science with its lusty offspring technology.

[Laughter]

Science isn't fundamentally about getting things done. Science is fundamentally about understanding what is going on. The search for understanding is absolutely central to science. Now to get the point, let me tell you a story, which I have to confess is a made up story.

One day somebody produces a sealed box and there are some knobs on the outside and the instructions say – Twiddle these knobs in appropriate ways to specify today's weather, press the red button and a perfect prediction of the weather in a week's time will come out. Well they give it a try and we find actually it works.

Now if science is simply about getting things done, all the problems of the meteorologists are solved. They just have to keep on twiddling the knobs and pressing the red button. Do you think they'd leave it at that? Not a bit. Very soon they will be tampering with the seals on that box and cautiously taking it to pieces to find out how it was able to model so perfectly the great heat engine of the earth's seas, land masses and atmosphere because they don't simply want to predict the weather, they want to understand the weather. And that search for understanding is fundamental to science as is a fundamental value. It's very important, I think, in our rather pragmatic society today to affirm the value of knowledge for knowledge's sake. And that's what science is about.

If you have that thirst for understanding, as I'm sure you do, it will not be quenched by science alone however. And the reason for that is a reason that George has already referred to, which is science has purchased its very great success, but it has purchased it at the expense of the modesty of its ambition. Science only tries to consider a certain limited dimension of experience. Experience of the world as impersonal, as an it, as an object. Experience which is repeatable and therefore can be put to the experimental test. Experiment is the great secret weapon of science. I say that as a theoretical physicist, but that's obviously true. But nevertheless we all know, as again George has reminded us already this evening, that there is a whole swathe of deeply important and significant human experience where the impersonal gives way to the personal, the repeatable is replaced by the unique. We'll never hear a Beethoven Quartet the same way twice, even if we play the same disk. And there is no algorithm or experimental testing procedure, as George has again pointed out, to establish the beauty of a Rembrandt self-portrait or the profundity of Bach's Mass in B Minor.

So we have to go beyond science if we are truly to understand the world. And there are many questions which are meaningful and necessary to ask which are beyond science's self-limited power even to pretend to begin to address. And let me just give you a couple examples of questions of that sort.

And one of those is simply this, actually it's rather a straightforward and simple question. So simple that most of the time we don't even think about it. And that is simply this –

Why is science possible at all? Why is it that within its limited purview we can understand the world so thoroughly?

Now of course, obviously, we've got to understand the world in an everyday sense if we're going to survive in the world. If we can't figure out it's a bad idea to step off the top of a high cliff, then we won't remain around for very long. But it doesn't follow from that, from that sort of evolutionary survival necessity, that somebody like Isaac Newton can come along and in an astonishing creative leap of the human imagination and see that the same force that makes the high cliff dangerous is also the force that holds the moon in its orbit around the earth and the earth in its orbit around the sun, and can discover the universal mathematically beautiful inverse square law of gravity. And in terms of that can explain the behavior of the whole solar system.

And of course about a couple hundred years after Newton, Einstein comes along, another great creative leap of the imagination, turns gravity into geometry. Discovers the general theory of relativity. And in terms of that, that linking together of space and time and matter is able to begin the construction of a truly scientific cosmology. A true account of the nature of the physical universe in which we live.

And if relativistic cosmology, and at the other end of the scale in my own old subject of quantum physics and elementary particle physics, we are dealing with regimes, we are dealing with realms of experience which are first of all, have no direct impact upon our everyday lives. And whose understanding calls for highly different counter intuitive forms of understanding. Everyday logic, everyday thinking will not explain either the quantum world or the world of curved space time.

So why is science possible in that way? Why is the world so deeply rationally transparent to us? And not only is it rationally transparent, but it also turns out it's rationally beautiful. A fundamental experience in science is the experience of wonder. The respect and awe that we feel at the beautiful structure of the world that is revealed to our inquiry. In fundamental physics, that is most powerfully expressed through the equations that are specified, fundamental physical theories which are always found to be characterized by the unmistakable character of mathematical beauty. Unmistakable to those who happen to speak that sort of language, it's a rather austere form of aesthetic pleasure, but it is a...

[Laughter]

...but it is a very real one. And we find that it has that way.

In other words, why is all that possible? Why can we understand the world so deeply? And why do we have this feeling and reward of wonder for all the weary labor of doing scientific research?

Well, I've been describing a world that's... that's the question, and it won't have a knockdown answer. But we have to seek the most intellectually coherent and intellectually satisfying answer to it that we can.

I've been describing a physical world which in its rational transparency and rational beauty is a world, you might say, shot through with signs of mind. And it is a proposition worth giving serious consideration to. And that it because there is indeed a capital M, Mind, of God the Creator, that lies behind the rationally beautiful order of the world.

I don't say... I don't present that as a proof of God's existence. There is no such proof in my view, nor of course a proof of God's non-existence, but I do present that as, for me anyway, the most rationally coherent and rationally satisfying understanding. An answer that science itself could never, in any form, attain. Scientists are very happy that the world is like that, very happy to exploit the intellectual opportunities that provides. But science of itself does not explain why it is so.

And another question? Well, here I again pick up a theme that George has spoken extensively and powerfully about this evening, the question of ethical questions. For example, should we do research on human embryos? A question I've been much involved with in committees offering advice to the government in my own country.

Now of course medical scientists have an input into that discussion about consequences and possibilities and so on. But they do not have, as scientists, the power to decide the issue. Both because science is not dealing with values. And also, of course, because people are not to be judges in their own cause.

Nevertheless, I think we all know that we do possess real ethical knowledge. I know it's contested, of course. But I cannot believe that our feeling, that for example, to move out to that particular part that's rather contested there, but our feeling that torturing children is wrong. That is not some curiously disguised strategy for the superior propagation of our genes. It is not some convention that our society has decided to adopt. We just happen to choose not to torture children. It's a fact about the world in which we live that torturing children is wrong. But all that ethical knowledge, as George has already pointed out to us, is something that we need as human beings, but which science itself will not convey to us.

So, there is scope for a much broader discourse than science itself can provide. And the religious faith traditions provide, I think, very important inputs to that broader discussion in relation to questions like – Why is science possible? They provide a more profound, more comprehensive matrix in which to incorporate our understanding of the world. In relation to ethical issues the religious traditions don't have a monopoly on ethical insights, but they are powerful sources of ethical insight based on very long experience.

So do science and religion matter? Absolutely. They do matter. They matter for the simple reason that truth matters. Both in science and religion the fundamental issue is the issue of truth. And that is something that is deeply necessary to pursue. And that's why we're gathered here in our ISSR meeting, and I hope it's why we're gathered here this evening in this discussion.

So thanks very much. And thank you, George.

[Applause]

Moderator: Thank you very much, John.

The final commentator for this evening is Professor Holmes Rolston, who won the Templeton Prize in 2003. He's known as the father of environmental ethics. He's one of the world's leading advocates for protecting earth's biodiversity and ecology in recognition of the intrinsic values of creation. He's University Distinguished Professor at Colorado State University and a Presbyterian Minister. He's had books published in eighteen different languages. He's lectured on all seven continents. He's at the forefront of those who joined biology and religion for the understanding of the earth's evolutionary ecosystems. An effort made all the more critical by escalating environmental concerns worldwide.

He first achieved wide recognition in 1975 for an article in ethics, *Is There an Ecological Ethic?* That challenged the widespread idea that nature was value free, and that all values stem from a human perspective. Nature, he contended, contains intrinsic values independent of humans and deserves to be treated as such out of respect for love of creation.

It was my privilege to be with him in a small annual discussion group that provided me with the intellectual high point of those years. And I remember vividly his introducing himself to the group as a tree hugger.

[Laughter]

And so I was very surprised a couple of weeks ago when we were together on another program that, in fact, his background, like our other panelists, is physics. His outlook has often left him an outsider among his peers. His first efforts to introduce an environmental ethic were rejected by mainstream philosophical journals. So, he reacted in some shock when he was invited to deliver the world famous Gifford Lectures in 1997 to '98 because prominent publishers had turned down the manuscript that was the heart of his lectures.

[Laughter]

Subsequently published as *Genes, Genesis and God* by Cambridge University Press, his work is now acclaimed as a monumental work. So I'm very happy to invite Holmes Rolston, III to speak.

[Applause]

Holmes Rolston, III: Thank you. I do notice that for some years I was introduced as the father of environmental ethics. Lately that's been the grandfather of environmental ethics.

[Laughter]

I once started a class in science and religion with a claim that these are the two most important things in the world, a student's hand promptly went up and he said, "No professor, you're wrong, it's sex and money."

[Laughter]

I'm not sure I convinced him otherwise. And I've been trying to convince others for a number of years that science is the first fact of modern life. And religion is the perennial carrier of meaning. And I do think that seeing, in terms of their long range personal and cultural impacts, science and religion are the most important forces in today's world. And I offer you six reasons why.

The first is that science cannot teach us what we most need to know about nature, which is how to value it. That claim might seem bold, but I was recently asked to author an essay in a leading biology textbook, in the seventh edition, because the authors were getting feedback from their students that they wanted to know something about valuing nature, about our duties to nature. Science teaches us natural history; it gives us great powers for the improvement of life through technology. But, as we've heard already this evening, science limps when it comes to values. What to make of nature looking at our evolutionary past. How to remake nature, given our technological abilities. Whether we wish a managed nature, and who the managers will be are not questions answered by science.

My second reason, science cannot teach us what we most need to know about culture. That is, how to value it. The other side of the question I was just asking, science has a hard back but a soft underbelly. We humans are increasingly competent about making our way through the natural world and decreasingly confident about its values and meanings. And that's not an accidental correlation. One of the proverbs of my country rearing was – The faster a blind horse runs the sooner it will perish.

[Laughter]

It's hard to discover meaning in a world where value appears only at the human touch. The doctrine of original sin is said to be the only empirically verifiable teaching in my Presbyterian heritage. Since 9/11 and Enron, we hardly need convincing that we face value questions as sharp and as painful as ever.

Consumer capitalism raised the living standards of many, though it may, seems to be making the rich richer and the poor poorer. One of our national goals seems to be escalating consumption funded by ever-smarter science. But my Shenandoah Valley ancestors thought of consumption as a disease.

[Laughter]

Power corrupts and absolute power corrupts absolutely. Lord Acton was absolutely right.

The third reason, science increasingly opens up religious questions. And that's contrary to a widespread opinion that science shuts down religious inquiry. If you look closely you will find religious dimensions in the thought of otherwise secular thinkers. I could cite twenty, but I have only time for two, so I'll take well placed Boston scientist. Stephen Jay Gould, closes his massive mega text on evolutionary theory... something almost unspeakably holy, I don't know how else to say this, underlies our discovery and confirmation of the actual details that made our worlds and also realms of contingency insured the minutiae of its construction in the manner we know.

Ed Wilson, great conservationist, a secular humanist, ever insistent that he can find no divinity in with or under nature, he still exclaims with emphasis – “The flower in the crannied wall, it is a miracle.” And he says – “the biospheric membrane that covers earth and you and me it's the miracle we have been given.”

Now maybe these code words – miracle, sacred, holy – are just rhetoric. But I think these men are feeling a deep undertow that's deeper than they realize in their encounters with these archaic orders.

My fourth reason, the future of religion depends on this dialogue. Now many of my professors taught me that science and religion were independent areas of life rather like law and poetry...

[Laughter]

...each with their own integrity, and to relate the two was to try to integrate incommensurables. They were half right. But it's that kind of half-truth that when taken for the whole is quite wrong. They said – “The religion that's married to science today will be a widow tomorrow.” They were half right. The sciences still come and go. Physics today is very different from the physics I was taught a half century ago. Biology in the year 2050 maybe as different from the biology of today as the religion of today is from the religion of 1850s.

But the science that is divorced from religion today will leave no offspring tomorrow. From here onward no religion can reproduce itself in succeeding generations, certainly not among the students on my campus, unless it has faced the operations of nature with claims about human nature with which science confronts us. It's something like an organism in its habitat in evolutionary history. You have to be a good fit for survival, if you over specialize it's almost a certain route to extinction. Religion that has overly accommodated itself to a particular science will soon be obsolete. Religion needs to keep its autonomous integrity. But religion cannot survive today without fitting in to the intellectual world that is its environment.

My fifth reason is that the dialogue between science and religion offers new opportunities for confronting suffering and evil. Something stirs in the cold mathematical beauty of physics, or in the heat of energy supplied by matter, there's life. And later there comes suffering life. Energy turns into pain. And the capacity to suffer evolves as a complement to the capacity to survive. Across the whole of evolutionary history,

renewed life comes by blasting the old. Life is pressed by the storms, but it's pressed on by the storms and environmental necessity is the mother of invention. Life is gathered up in the midst of its throes.

The Darwinians see this truth as their struggle for survival. But so far from making the world absurd, this suffering is a key to the whole. Seen not as an end in itself but as a transformative principle, transvided into its opposite.

The Darwinians see the dark clouds. The religious people see the silver lining. We begin to see the sacred character of life and its struggling beauty. New life rising out of the old, good resurrected out of evil, and experiences of the power of survival have come to be well explained by the theory of God.

I call this a cruciform creation. The perennial regeneration of life in the biological sciences is the predecessor to the redemption of life in the religious dimensions of life. There's something divine about this power to suffer through to something higher.

Earth is a kind of providing ground where the life epic is lived on in the midst of its perpetual perishing. Life is lived through grace in a besetting storm, green pastures in the valley of the shadow of death. Today we say – life is generated at the edge of chaos. Yesterday John said – the light shines in the darkness and the darkness has not overcome it.

My final reason, the dialogue between science and religion matters because the future of earth depends on it. I've been lucky enough that my own personal agenda, figuring nature out, has during my lifetime turned out to be the world agenda – figuring out our place on the planet. In that sense, my sort of own autobiography has been writ large in the earth agenda.

I did not want to live a denatured life. And it turns out that humans neither can or ought to denture their planet. But my sense of wonder turned to horror when I encountered the oncoming environmental crisis. No sooner did I discover that nature is grace than I found we were treating it disgracefully.

Facing the new millennium the four principal interrelated challenges of war and peace, population, development, and environment. Science alone cannot teach us what we most need to know about any of the four. Now maybe religion does not have all the answers or easy answers, but it does offer a comprehensive worldview within which we might work out some answers. If anything on earth is sacred, it must be this enthralling generativity that characterizes our home planet. If there is any holy ground and any land of promise, this promising earth is it.

Biblical faith originated in the land ethic within the covenant, keeping the commandments the Hebrew people entered a Promised Land. Justice to roll down like waters, and the land flows with milk and honey. A blessing can be received only if the land is inhabited justly and charitably. No people can live in harmony with their landscape unless there's social justice. The land of promise has now become the planet of

promise.

It's not simply what a society does to its slaves or women, or blacks or minorities, or handicapped or children or future generations. But what a society does to its fauna, flora, species, ecosystems, landscapes – that too reveals the character of that society.

Astronaut Edgar Mitchell saw earth from space as a sparkling blue and white jewel – rising gradually like a small pearl in a thick sea of black mystery. And he continued – “My view of our planet was a glimpse of divinity.” The secular autonomy that once seemed to banish any presence turns out to be a haunting incompleteness.

We need science talking to religion and religion talking to science to figure out who we are, where we are, and what we ought to do.

[Applause]

Moderator: Ladies and gentleman we've heard three remarkable presentations here, sponsored by the International Society for Science and Religion. But the evening is not yet over, since we're prepared to stay here until about ten o'clock. And that means it's time for you to ask questions. But before you do that, at the risk of having total pandemonium and chaos, I'm going to give you approximately ten seconds to stand up and stretch before we go into the question period, about a few seconds apiece. So I will ask those of you who do want to ask...

All right here's a microphone for this man... it's going up in the back row... and you'll be next...

Male: I'd like to know what great things that you can reveal that have been accomplished for the human race through religion.

Moderator: Well, all right, I'm going to put George Ellis who's certainly... was working against apartheid from a religious framework. George, over to you.

George Ellis: I suspect that on allowing this is an awareness of the injustices which have been done in the name of religion, of which I'm extremely aware. Nevertheless, great good has also been done through religion. And what I think one needs to do here is look at the change in the spirit of the world which has happened over the past two or three hundred years, in which the valuing of humans has been enhanced in an extraordinary way. For instance, public torture was rife right around the world three hundred years ago; it was part of the way things were done. Slavery was rife. And so on and so on.

And I will speak specifically from my own tradition, the Quaker tradition. Quakers have been at the forefront of the increase of human right across the board in terms of women's rights, slaves, the rights of people in hospitals – in mental hospitals you were treated as if they were animals three hundred years ago. And the push for peace. So there have been serious problems in some ways that religion has behaved, but it has indeed been a great force for right values in many ways.

Moderator: Can we bring the microphone up to the front row here, there's someone... has a question... right here at the corner...

Male: Yes. First I'd like to point out that actually someone has proposed the MilliHelen, which is very topical in regard to the Olympics in Greece; it's the amount of beauty required to launch one standard trireme.

[Laughter]

But seriously, I've got a question for Rev. Dr. Polkinghorne in terms of whether, perhaps, the view of life on the edge of chaos might have important implications for recent discoveries that you can reprogram an adult stem cell by putting it into a different tissue, and it seems to receive new signals and respond quite differently than it would somewhere else.

Moderator: So again, to summarize, his question is – is life on the edge of chaos, significant...

Rev. Dr. Polkinghorne: Is this mic working? It will save trekking around. Well, I think the principal of the edge of chaos essentially says that if the world is to be fruitful and to produce novelty, it mustn't be too rigid, otherwise nothing really changes, you just get rearrangements. It mustn't be too haphazard otherwise nothing persists. And that does seem to be an insightful thing. But it also means, of course, that the fruitful domains are also going to... the domains of a cruciform naturalism that Holmes is talking about.

I won't comment on the reprogramming of stem cells, that's too technical a point, I think.

Moderator: We have lots and lots of questions, and I don't see where the microphone carriers are. Okay... somebody wants to ask a question back there. Yes, go ahead...

Male: Yes, hi... I want to thank the three of you for a very spirited discussion. My question for you is – this vision you have of this international panel that would deal on the interfaith issues of making moral decisions. How do you avoid getting into the same problem that a lot of the post modern deconstructionists get into where you get this moral relativism and you don't really develop a hierarchy of moral decision making when you're dealing with multiple faiths. And also, I wanted to ask if you've done any work with Ken Wilber too, since it seems like it's very similar to the work he's done on much of his writings. Thank you.

George Ellis: I'm confident that the spiritual traditions of all the great world religions agree on their moral values. I think, actually, that's one of the really extraordinary things about them. I've talked about this issue of kenosis, of self-emptying, of giving up – across many places in the United States, Britain, and other countries. And one of the things that happened to me in California, at one of the Science and Spiritual Quest meetings, I was talking about this, I finished my talk – a very excited man came up to me

and said “That was an amazing talk, you talked like a true Muslim.” And I had the similar experience listening to the chief rabbi of Great Britain in New York talking about how... I went up to him afterwards and I said – It was amazing the way you talked about ethics, you talked like a true Quaker. And he looked at me and he said “I would choose to take that as a compliment.”

[Laughter]

I really believe that there is a common understanding at the basis of the religions of ethical issues, even though they disagree about the way that they envision the nature of the transcendent. And so I think it would be possible to have a panel which would really work. As to Ken Wilber, I have tried to understand him and failed, but I'm going to keep on trying.

[Laughter]

Male: Yes, hi, my name is [Yugo Kapatonowitz], I'm a rising sophomore at Harvard, and next semester I'm planning on taking calculus, and the question I have for the three of you is a question from calculus. And the question is – Does the limit as scientific inquiry approach infinity equal God? And if so, how, why, and when?

[Laughter]

Moderator: That's one... I have to say that this morning Dr. Ellis gave a very interesting talk about the questions of infinity related to the multi universe cosmology, and he's an expert.

George Ellis: I'll answer this in a slightly round about way. As cosmology proceeds at the moment, cosmology is coming to the limits of what can be done in the scientific domain. What I mean by that, it's beginning to look at fundamental questions, when in fact philosophical issues arise and cannot be answered in a purely scientific way. For instance, cosmology is now a substantial part of cosmologists are asking the question – Why is the universe fine tuned in such a way as to allow us to exist? That's one of the issues which many cosmologists are looking at at the present time.

And as it asks that kind of question, it can no longer be answered in a purely scientific way because what comes into play there is the question – Why are the laws of nature the way they are? Why are there any laws of nature at all in issues like that? And those cannot be answered in a purely scientific way. So I think, in the spirit of your question, the answer is – Yes, as science proceeds towards its limit it necessarily does begin to ask questions which, in essence, are theological in nature.

John Polkinghorne: I also said, first of all, beware of being bewitched by verbal power levels, and try and think through whether there really are connections between apparently similar words. Second thing is, calculus was a wonderful discovery to deal with smooth variation, and we're getting at science through fractal geometries and things to realize that there is a jagged side to the story as well. So by all means, learn calculus, it's a good first step. But there may be some second steps to make.

[Laughter... Applause]

Moderator: Let's take the question over here on the corner...

Male: Hi... I'm just a... I'm a local pastor, so I don't know a whole lot about science. But I think my question is mainly for Professor Ellis. Professor Ellis, I was excited when you said the science and religion dialogue will help with, if I understood you correct, pollution, war in Iraq. Here is a question that I struggle with as a pastor every day with my parishioners – affordable housing in Boston. How would science and religion perhaps help with that?

The reason though... or the way that we have sort of approached that here in Boston is, you know, you work with the people who actually have the problem. But in fact, if you go around and you meet some folk, you find out that a lot of them are fundamentalists, whether they would define themselves that way or not, they perhaps are types of folk who say that the part is in fact the whole. However, they have an issue just like my people have an issue. And we come together and work on it together.

But, if I understood you correctly, the bad person in the inter-religious dialogue is the fundamentalist. If that's true, how does this type of inter-religious dialogue that you're laying out here actually... how is it a social form of repair rather than what it may be an actual form of exclusion rather than embrace. Because it is saying – Fundamentalists, you are not allowed. And how does that also play over into a theological understanding of kenosis, which if my understanding kenosis of being self-emptying, does not discriminate based on whether you recognize the scientific method as the basis for dialogue or not?

George Ellis: There is a host of questions there. I did indeed write some books on housing policies, as mentioned, quite a while ago. And of course, this is, I would say it's a little far from science per se. What science can do in this regard is help to look at the alternatives. And that's what I was doing as an applied mathematician looking at housing policy – we started writing computer programs looking at the housing problem, looking at how much people can afford, how many houses were needed, how you could fit together the funds available in order to do it. So in that sense, science can help in that kind of issue.

The religious thing still comes into the values, and in a sense I don't have any immediate answer to that, I would have to think about that.

As to the issue of the fundamentalism, I'm not saying that we should not reach out to the fundamentalists. Yes indeed we should. Our problem is going to be – How do you transform a fundamentalist who knows the answer to everything? Because if they know the answer to everything, there isn't that openness which enables them to be able to respond to that. One must try somehow to reach out to fundamentalists in a way which says – Look, there are other viewpoints. We do understand you have something you're saying. We do understand that. But please, is it really the entire and the total truth? So

I'm not trying to exclude them. I'm just saying that it often is a very barren ground to try to talk when you're talking with fundamentalists because they know the answers. And that means they simply don't have that openness which makes it a fruitful dialogue.

Moderator: I'm going to ask very specifically – Does somebody have a question for Holmes Rolston?

Yes, there's one over here – can we get a microphone down to this corner? Here it comes...

Male: Thank you. My name is [Randy Rhoda]; I'm a teacher at a couple colleges here. Other gentlemen please jump in on this question as well. But I'm very upset that our present administration chooses to ignore and repudiate so many environmental scientists who say we have very large problems, not just with our own country's environmental degradation, but the whole world's. And that global warming would be part of that, but not all of it.

And political powers that find it easy to ignore scientists, even though scientific consensus seems to exist at this point that we have real problems that we have to do something about fast.

What can scientists do, beyond what they've already done to make it less possible, or impossible for political leaders to ignore them? To have more power at the political realm than they have today, which seems to be if political leaders want to ignore scientists they can say – Well we have a few scientists who disagree. Therefore, global warming doesn't exist because we can find a few right wing guys who say it doesn't exist. Or – They're still questioning it, we need more studies.

Moderator: Over to you, Holmes...

Holmes Rolston: I don't have easy answers to that. The scientists ought to keep the pressures up. Didn't we hear in the UK recently a problem that meteorologists said that the threat of global warming was greater than the threat from Iraq or whatever? Those kind of pressures, I think, do make a difference.

Now the present administration has not got a good record environmentally. But the present administration is dealing with the people I work with like U.S. Forest Service, Bureau of Land Management, National Park Officials – who love the natural world, wish to conserve it. And they have a way of dragging their feet waiting for a new administration, in part...

[Laughter]

It's not like the government as a whole has been as a disastrously anti-environmental as the signals that come out of the present administration have been.

And I would like for you to take the long view, let's not just think about the present

administration, but I'm the grandfather of environmental ethics, right? And in my lifetime we've set aside six hundred wilderness areas. We've had the clean water act, right – you can probably swim – you know, fishable, drinkable, swimmable – you probably got fish in rivers and can swim in rivers around Boston that you couldn't do so thirty years ago. I wouldn't drink from them yet.

[Laughter]

We've got the Clean Air Act. Business people dragged their feet on that. But there's no business selling automobiles today that wants to go back to the way automobiles were functioning twenty, thirty years ago. If you take that kind of view, there has been progress of sorts. So let's take the long view and keep voting pressure up on administrators. As good a place as any, I think, to push is with toxics, right? People may not be concerned about saving the butterflies, but they don't like poison in their drinking water. And so if you can push those kinds of issues, you usually can get, I think, a good political hearing.

John Polkinghorne: Can I say... I think that if people want to influence the political process, whether they're scientists or religious people, they've got to be prepared to take part in the rough and tumble of the political process and can't do it just from shouting from the sidelines.

[Applause]

Moderator: All right, we still have time for a few more questions. And I know people in this section have been very patient. Where's our microphone? Let's go... yes, there to the third row...

Male: Geologists – they drill holes in the Arctic ice cap, they came up with these rings – twenty-two different rings. They say they represent different ice ages. But in fact they represent different global warmings. All the soot and dirt just melted down through the ice caps and suddenly refroze. One day sixty, the next day thirty. That's why they found animals completely frozen in ice with no deterioration.

The pyramids of Egypt, they tell us that it took over five hundred years to build...

Moderator: There's a question coming out of this?

Male: Yes. The question is – The people who built the pyramids of Egypt, could it be possible that they converted back to the animal instincts, became nomadic hunters, cave dwellers all over again to survive the ice age?

Moderator: I'm going to pass on that question because I don't think it's relevant to our panel. I think it's...

Male: It has a lot to do with religion. The birth of religion comes out of the ferals...

Moderator: Any of our panelists agree with that?

Panelists: No.

Moderator: All right, we'll go on to another question. Let's take the one right there in the middle.

Male: I am both a rabbi, and I hold a doctorate in philosophy, an uneasy combination which my question will reflect. My question is addressed to Dr. Polkinghorne and your argument that the universe points to a divine mind. Wearing my rabbi hat I am very sympathetic with that view. However, there are philosophers, as you doubtless know, who will say that the human mind is a product of millions of years of evolution and is simply an emergent phenomenon, and humans are the first ones to have minds. And of course the arch British skeptic Hume said – “Why should the agitation we call mind be taken as a model for the whole universe?” Dr. Polkinghorne, how would you reply to that?

John Polkinghorne: Well, I would say that I think that the history of life as we understand it, we understand it rather better than Hume was able to in the eighteenth century, does show occasions of qualitatively normal emergence. Life itself, consciousness, and then self-consciousness and the rational and spiritual powers that go with that. And I think that we have, there's a point really, George made, we have every reason to trust those powers and no reason to distrust them. That to how they arose does not explain them away. I mean, I think God acts through nature and I think that the hominid mind developed in that sort of way. But that doesn't cause us to not rely upon it. And – what else can we rely upon? And what else was David Hume relying upon?

Holmes Rolston: And the human mind is the most complex thing in the known universe, let's not put it down as a trifling result of evolutionary survival tendencies. Read your neuroscience, it's got staggering possibilities of thought, the number of thoughts you can think exceeds the number of atoms in the universe. Just enjoy that sometime when you're feeling...

[Laughter]

...and not very productive.

Moderator: I think there's a question way in the back...

Male: Yes... First thing I wanted to say is I never heard of this outfit until I saw the Globe ad last week. And I just want to express my deep gratitude that somebody is doing this. Thank you so much.

[Applause]

What I'd like to know is if you as a group are advocating more scientific inquiry... you know the word I mean... it's hard to pronounce... but gathering more empirical evidence,

you know really studying what provokes different states of consciousness, which I would prefer to call levels of consciousness as in acknowledging that there are higher levels of consciousness and lower levels of consciousness, and I'm not going to make any obvious examples.

I know MIT has done some work with the Dali Lama, and you know, done... they haven't really drilled down, if you know what I mean. They've really barely scratched the surface. But is this something that you advocate? You know, I would like to encourage you, on my own personal behalf to advocate that.

And I just have one comment about the kenosis and the fundamentalists and all that. I mean every religious tradition in the world has the same sort of concept where until the vessel is empty it's not going to be filled with the divine or the holy or... but, I mean, I would prefer to think of these folks that are doing great work... you know, their vessel is not half-empty, it's half full, God bless them, they're doing great work... How do we address them and take them to the next level?

Moderator: I'm going to ask our President of the Society to respond to that.

George Ellis: The issue of consciousness of the mind is one of the most important ones facing us. Is this on... The issue of the consciousness of the mind is one of the most important issues facing us. And for the moment what I would concentrate on, and what quite a number of us are concentrating on is not what you've raised, but is the really crucial issue – Is free will real? Are conscious decisions actually meaningful? And I gave you some quotes about how this is being attacked by a whole group of neuroscientists. And to me, for the moment, this one supersedes the one you're saying – we really want to be sure that we can defend the view that despite the fact that the mind is in some sense a machine governed by physics and chemistry, nevertheless, that free will conscious decisions that we as human beings are meaningful and what we do makes sense and is important. And that to me is one of the most crucial things that we are looking at the present time.

Karl Giberson: Hi, I'm Karl Giberson, the editor of *Science and Theology News*. I'd like to make a comment, and follow up with a question of both – the way that religion has been discussed here, it seems to me that there's an analogy here in the hierarchy of the sciences with the comment that you made George, that in the hierarchy of the sciences, physics at the bottom, especially mathematical physics is beautiful and elegant and very harmonious. But as you go up the ladder to chemistry and biology it gets messier and messier and messier. I kind of wondered if this kenosis that you're talking about, that's this unity that maybe all the religions share, isn't like the underlying physics, but that their religion that people live every day is more like biology, which is messy and chaotic and we live on the edge of chaos. And when we talk about insights coming across that bridge from religion to help science, it seems to me that that's a very discordant non-unified voice that we have there. And although there may be moral messages coming across there, it's so discordant that it's hard to know what, exactly, that message is.

And, for example I would use... point out that Polkinghorne has mentioned torturing

children as something we can all agree is unambiguously wrong. But it seems in today's world that the circumcision of young women would be the closest thing that we have to authorized torture of children, and that's done in the name of religion. Could you comment on that?

Moderator: Were you addressing that to John Polkinghorne, or to George Ellis?

Karl Giberson: I'd like to get George's general answer about the analogy with kenosis... and then John's response to...

George Ellis: Well, as you go up the hierarchy, yes, there is this enormous variety that generates, and one of the extraordinary things is how simple cores underneath lead to the great variety up at the top. And there is discordance in the way that religion views the metaphysical reality underlying the transcendent reality, but all I can do is repeat what I believe is that at an ethical level, I do believe there is a greater concordance of belief between the different traditions, and I believe that we will be able to explore that and try to make something of that through the investigations we'll be doing. I don't think that I could say much more than that in the very brief time that is left.

John Polkinghorne: I'm going to try it... the story of religion is extremely complicated, great distortions, great, I think, benefits, great insights. It's very complex and certainly not unambiguous in that respect. And when... part of the problem of ethics is to understand exactly how... ethical things often point to a different directions, and then how do you resolve the clash of that.

Let me just take one example. Take the embryo research business. Everybody in the medical world and ethical world agrees that you don't treat human beings as a means to an end. You treat them as ends in itself. Where we don't agree is is the very early embryo a full human being? And how do we resolve that? Well, I've got some ideas on that, but I won't give you a lecture on that.

Moderator: Holmes, do you have a final comment to end our session?

Holmes Rolston: In the presence of my august company I'll...

John Polkinghorne: Come on... come on, Holmes...

Holmes Rolston: Well we might come together in the various religions, in some sense of caring for this planet that we inhabit. Again, religions have had very different worldviews, maybe about the nature of the planet. But so when it comes to facing hope for what is the ultimate survival unit, religions may come to agree that whatever way you work it out in this culture or that or another one, that what we want is a kind of view in which the planet can be here five hundred years, a thousand years, five thousand years... realize it isn't going to be here five billion years from now, but we'll face that problem later. Maybe religions can get together in some sense of caring for this marvelous planet we inhabit.

Moderator: I'm sorry that my choice of the questions was rather much like roulette, and some of you had urgent questions to ask, I'm sorry we didn't have time to get to them. But I think that's it ladies and gentlemen. And I ask you to thank our speakers once again.

[Applause]

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