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*Universe with Man in Mind*

*The New Paradigm*

*Glen Schaefer*

*Translational Press*

## Acknowledgements

### Interview

The two-part interview, by Henrietta Buckmaster, editor of The Home Forum page of The Christian Science Monitor, was one of a series with poets, artists, peacemakers and scientists, "Towards the Frontiers of Thought". The two parts were published on 11 and 12 July 1979. They are reproduced here by permission from The Christian Science Monitor.

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### Lecture

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### Appendix

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### Editorial Assistance

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# *Universe with Man in Mind*

## *The New Paradigm*

*Glen Schaefer*

### Interview

- |   |   |
|---|---|
| Part 1: Insects in Flight; Thought in Motion                | 2 |
| Part 2: The Universe and our Concepts: which the Reflector? | 9 |

### Lecture

- |   |    |
|---|----|
| The Universe and the Mind of Man – which the Reflector? | 15 |
|---|----|

### Appendix

- |                  |    |
|------------------|----|
| The New Paradigm | 40 |
|------------------|----|

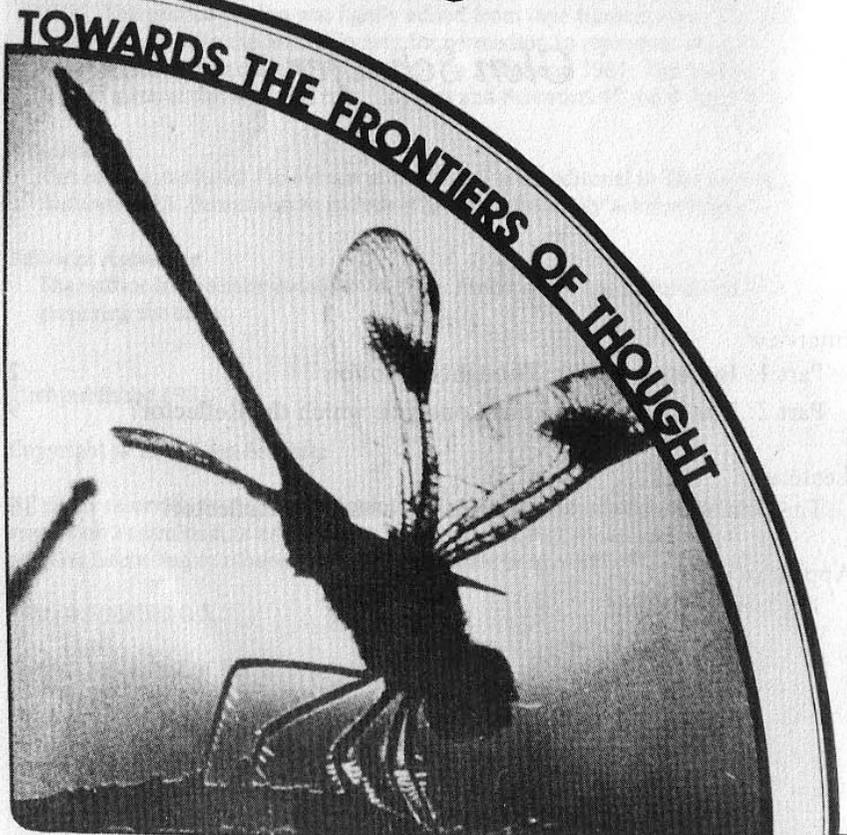
*Translational Press*

Dr. Glen W. Schaefer, a Canadian now living in England, has had a distinguished career in mathematical physics and in biology. Twice he has advanced so far beyond the frontiers of thought that, for a time, he alone was exploring certain aspects of ecological development.

He is now director of ecological physics at Cranfield Institute of Technology. He is a Fellow of the Royal Entomological Society and a Fellow of the Royal Meteorological Society.

In England recently, Henrietta Buckmaster, editor of the Home Forum page, had the following talk with Dr. Schaefer. The second half of this interview will appear tomorrow on this page.

## Insects in flight; thought in motion



I think it's very illuminating to learn the hows and whys that lead an individual to a career that blazes many paths. So, Glen Schaefer, how and why?

When I was 12, suddenly on one memorable day, I became vitally interested in bird study. Happened in a flash, you might say. I tracked the birds to woods and marshes. I became obsessed. Eventually this became a fascination with all natural motion - migration, meteorology, flight - and my studies have now become almost synonymous with mobility and motion in the universe.

But a lot must have happened during the 25 or 30 years since the beginning of all this?

In high school I was equally good at mathematics and physics on one hand, and biology on the other. I decided to do mathematics and physics at the university, hoping that one day I could turn my attention to biology - rather than the other way around.

Isn't it rather unusual to combine the quantitative thinking of a mathematician and physicist with the qualitative thinking of a biologist?

It's not easy. It's rare when a biologist can handle mathematics or any of the hard sciences. This means there's a great lack of persons who can span both disciplines. And yet we need them desperately in order to assess the ecological problems we're facing.

But this is what you're doing, isn't it? What about the several steps you needed before you reached this point?

There were more than several. After receiving a doctorate in mathematical physics, I spent eight years in Britain leading a team in industry which developed a theory of nuclear reactors.

Did this raise any questions about the moral implications of nuclear power?

Well, I turned down the chance to be head mathematician on the further

development of the hydrogen bomb for Britain. I think I made the right decision.

Hurray for you! What was your compensation?

I continued in industry for two more years, developing a theory of jet engine noise. Out of this I evolved the first successful theory of the aerodynamics of the flapping flight of birds. This began as a side interest. While I was working in nuclear power I was studying, for my own pleasure, bird migration in various parts of Europe. I got particularly fascinated trying to understand how the thousands of millions of birds crossing the Sahara desert each year from southern Europe, were able to fly apparently nonstop, 1,500 miles to mid-Africa. I began to look at it from the mathematical-physics point of view.

Biology and physics coming together - with an overlay of some deeper concern?

Yes. Ever since I was five, I've had a very strong urge to see the whole of anything and everything - it's a spiritual kind of feeling.

Having to do with the philosophy of science, perhaps?

More precisely - metaphysics.

Birds must be a good symbol leading you there.

Well, I had many pragmatic discoveries to make. For example, how much energy a particular bird species required to overcome the drag forces on its oscillating wings during a 1,500-mile journey, and how much fat it would have to lay down as fuel. I had a great ambition at that time to install radar in the middle of the Sahara to detect the migrants at the halfway point between Europe and central Africa. I managed to buy an ex-army radar for very little and, as a preliminary, put it in a farmer's field in central England and began to track individual migrants. I soon recognized a phenomenon - that radar echoes from birds showed the target identity through wing beat patterns.

Wing prints?

Yes. As a result of an Associated Press report on this, I was offered four university appointments. I accepted one and went straight into the area where I could combine mathematical physics and biology.

This must mean that there was enough awareness of the unique, even revolutionary, direction you were taking to give you plenty of support?

Well, it allowed the development of a new subject - ecological physics. This means that the methods, techniques and philosophy of physics can strengthen biological research. I started with the nearest thing to me, bird migration, and applied it to the growing hazard of birds to aircraft, and vice versa. A number of aircraft, especially military aircraft, are knocked out of the sky each year by birds being ingested into the engines. People are killed, not to mention the birds. This led to the next stage - insects in flight.

Let my imagination catch up with you. Do you mean that the almost inconceivably small wings of insects can be picked up and identified by radar?

Yes. It was a challenge offered me by an entomologist who had heard me lecture at a conference on methods of radar detection of birds. He asked if I could track an individual desert locust by radar. I said yes, I thought I could to a range of a mile with a simple radar. Here was my golden opportunity to get radar into the central Sahara. And I suppose it was not really a surprise to be faced with the fascinating motions of other creatures - cloud forms, winds, birds - now insects.

How high up, and how far, do insects fly?

No one knew at that time. The prevalent theory was that desert locusts, flying at night, fly upwind at low levels for only a kilometer or two, seeking, apparently, ephemeral grasses which are the result of some rare desert cloudburst. But the first 15 minutes on radar showed something very different. I knew I was looking at desert locusts because the wing-beat pattern on the echoes was identical to those locusts in wind tunnels. But they did not fly as people had thought. These were flying very high, up to 6,000 feet. They were flying downwind. They

were using a low-level jetstream, which we discovered in the Sahara, and were therefore travelling at about fifty miles an hour. And they were flying for considerable periods of time and moving up to hundreds of kilometers in a night. It was shown to be possible for individual locusts to cross the width of Africa in about three nights of flying. They always oriented their nose downwind, moving fast while searching for moist patches of ground in which to lay their eggs. Such patches are so scarce and erratic and unpredictable that locusts frequently have to move thousands of kilometers to find a suitable breeding ground.

Is the individual locust a harmless creature? Does the danger begin when they swarm?

Yes, I was asked to keep my eyes open for some clue as to how solitary night-flying desert locusts could come together in a swarm. I think we got a strong clue during that expedition. There are certain types of winds, known as katabatic winds, which are tongues of cooler, denser air flowing down slopes at night into warmer valleys. These meet the warmer, less dense winds at lower levels, producing a convergent nose of colder air which collects insects of all sorts together, including locusts, and gives them a long-range transport.

What does a "swarm" consist of - thousands, I suppose, in a really destructive swarm?

No - thousands of millions. In a night sky thousands can collect together and be deposited in the valley where the downhill currents come to a halt. Once several thousand locusts are aware of several thousand others their behaviour changes immediately. They become completely gregarious - and this can happen in a matter of hours, like people on a beach. In a matter of days, the colour changes to pink. Having got this social glue, they start flying by day - I suppose because even hundreds of storks would have little effect on millions of locusts. They use the daytime convection currents to go long distances.

Can one foretell when these swarms are going to develop?

We are now helped by using satellites to search for green areas which, following rare desert storms, grow up ephemerally around the Sahara

and the Punjab and the Middle East. But there's still a missing link - there aren't enough ground observers; it would cost far too much to inspect every new green area. In the last few years I've developed a new airborne radar for detecting flying insects. I believe this radar can help monitor locust activity around the green patches.

I know you've worked for a number of countries plagued by destructive pests. Where, and what problems?

We started in Australia on the plague locust, then in the Sudan on a smaller insect - the cotton bollworm moth which was eating cotton plant buds. We then applied this method to a small moth, the spruce budworm in Canada, and recently we've gone to even smaller targets in England - individual wheat aphids a few millimeters long - using radar together with infra-red methods.

I presume all this research is directed at control. I know you're not a great man for killing, so how does the control work?

It's becoming clearer that insecticides lead to all kinds of extreme problems. The more one sprays and the more one kills, the more pests there are the next year. Here's a sample calculation: many female insects lay about 200 eggs. In order to keep the population just ticking over, only 2 of those 200 eggs need survive to adulthood to create another mated female with 200 eggs. 99 percent mortality is provided for. Man comes along, spraying, and the survivors are now able to live in an environment with less competitors, more food for each, and with some chemical resistance. Those few survive better than if you had left everything alone, and 3 are left as adults, say. This increases the population by 50 percent, such is the delicate balance of nature. Thus nature protests very loudly when chemicals - insecticides, herbicides - are introduced. I see a parallel here with the human body and the doses of chemical drugs we inflict upon it. Just as less drugs are now being recommended by leading medical scientists - if healing is the objective - so we should treat the body of nature. I've found ways of using minute amounts of chemicals - just like old-fashioned homeopathy - but even that (I'm convinced) will have to stop sooner or later, because there's no way in which man will ever be able to control nature by these means.

To me they are an imposition, not in line with the destiny of man.

This leads us straight into the deeper areas, doesn't it, of how one is going to handle this. I know you've done a lot of thinking about it. Are you anywhere near a conclusion?

No, but I'm frequently asked to help find solutions to whatever ecological problem is present. Science is usually blamed for the problems, but I don't think that's fair. In most cases it is technology which has made the problem acute. Yet technology is almost always - amazingly - appealed to before science. You get out your chemicals and throw them around in the Western belief that man has a right to this kind of dominion over nature. The humanists of the Renaissance saw man as able to understand and then to control everything that impinged upon him. I believe in our need and ability to understand, but I feel it must be a sensitive understanding of nature's needs, not just man's needs. I work on the theory that my function is to increase the understanding of what is happening in these ecological networks. The best way I know of doing this is to get out and mix with nature very closely, which very few biologists or physicists do. They're taught to work in laboratories instead of in the field. I believe one has to learn through sympathy. It's a necessity if one is ever going to understand what's happening and then why things are going wrong. It will give us clues to alternatives, and a great deal of joy. But going further - into a new relationship with nature - will require a lot more insight than we have at present.

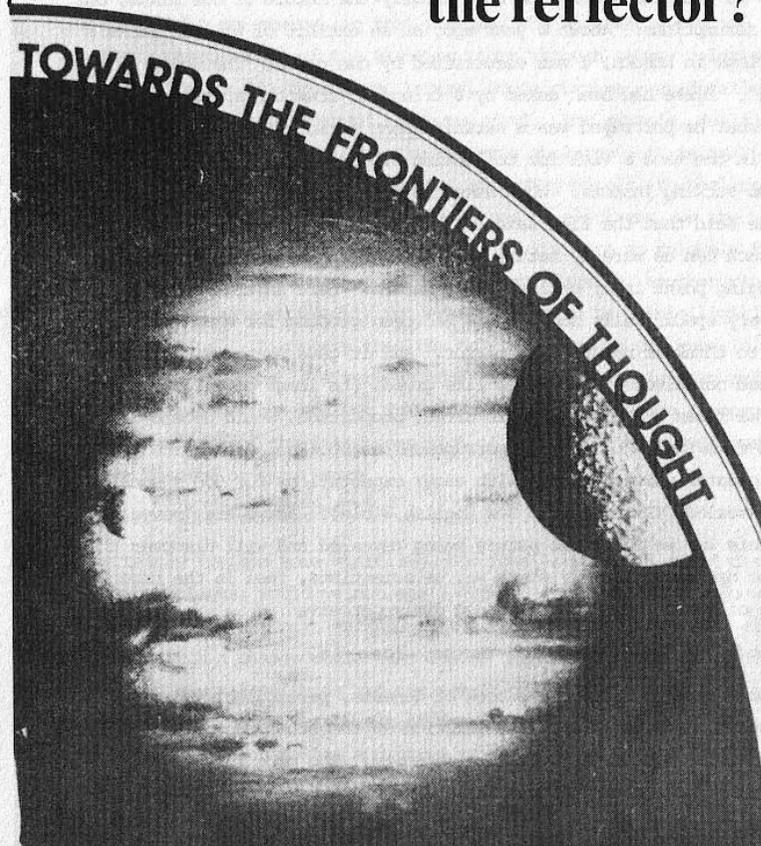
How do you pursue this insight?

I fall back - intuitively - on older religious viewpoints. I think the phrase "Man has dominion over the earth" which is used in Genesis by the men of King James, cannot possibly mean that man has the right or the ability to control or dominate nature in any way at all. Whether this "dominion" means a form of stewardship, as some people are beginning to think, I'm not sure. But it's certainly a higher and more congenial thought to me, for I have a feeling that man cannot be separated from or opposed to nature and retain his own mental and physical health. Man and the universe are one in what appears as an intricate web of connections, in which no single part has absolute control over any other part. But what this means in our present human situation I'm not sure. I think we shall have to learn to co-operate and cohabit together - not as master and slave - but we shall need to sacrifice to bring this about.

**The universe  
and  
our concepts:**

**which  
the reflector?**

**TOWARDS THE FRONTIERS OF THOUGHT**



There's a question I'd like to put to you, although I'm afraid it may be a polemic rather than a question. It seems to me that one of the great next stages of human experience and insight will be a wholly new sense - spiritual, I hope - of what nature is and of what creatures are - whether animal, bird, insect, fish, flower, plants, trees, stones. It seems to me they have not been involved in the sense of benign, total creation which is beginning to take some form in scientific thought. What do you feel?

Well, I know for certain that we are being forced, for many reasons, to reconsider our attitudes toward everything within the universe. To me nature is a kind of mirror. When we observe nature with the least bias we are seeing more and more clearly the nature of our minds, our own assumptions. About a year ago, at an exhibit of William Blake's drawings in London, I was electrified by one called "The Ghost of a Flea". Blake had been asked by a friend to draw the spirit of a flea, and what he portrayed was a satanic human form, quite grotesque, holding in one hand a vial for collecting blood (see Figure 1). Fleas are blood-sucking insects. When asked to explain all this a bit further, Blake said that the flea said, 'All fleas were inhabited by the souls of such men as were by nature blood-thirsty to excess'. This was a changing point in my philosophy of nature. Here an artist had portrayed very specifically something I had been groping for when I was beginning to think of nature as a mirror. And it gave the hope that as we purged ourselves of qualities like greed, the image of fellow creatures - like fleas - would change in direct proportion, would become liberated from their "bondage to corruption" as St. Paul called it, "for the created universe waits with eager expectations for God's sons to be revealed" (Romans 8:19, New English Bible). As we are "revealed" in this way we shall see nature being revealed and will discover the basic order and harmony which we, as scientists, feel is the true nature of the universe, even though dimly perceived.

Nothing else makes much sense, does it?

I constantly go back to the book of Genesis, particularly the first chapter, and to the book of Revelation at the other end of the Bible, since these two are basic to Christianity. The more I study what these ancient people thought about man and nature, the more I'm convinced

that Paul's meaning was correct - that it is up to men to understand nature by purging their own minds, penetrating straight through the faulty education we've all been given.

I was reading recently a quotation from Louis Pasteur - certainly one of the greatest of biologists. He wrote, "I see everywhere in the world the inevitable expression of the concept of infinity. The idea of God is nothing more than one form of the idea of infinity. The ideals of art, of science, are lighted by reflection from the infinite". What do you say to that?

It would be hard to better that statement, though I see it in a slightly different way. I've been talking about fleas and pest problems and about holding up a mirror. Enlarging that to include the entire universe, a few scientists are seeing, in that picture, the apparent evolution from the first microseconds of the Big-Bang right through atoms, galaxies, planets, life, cells, organisms, brains, consciousness - as detailed unfolding of the assumptions of the human mind. For example, dealing with galaxies and gravitation - the universe at large - it is amazing to a number of theoretical physicists, including myself, to realize that certain constants of nature, like the charge of electrons, or the mass of a proton or the inverse square law of gravity, are so uniquely fixed that if those constants were shifted, even so slightly, another kind of universe would have evolved, a universe that would be unintelligible to this human mind. It appears that the only universe we can know is the one we see. Now this is a very strange thing for scientists to reflect upon. The proposition was put forward only a few years ago. It opens up a whole new area of the interconnection of our educated assumptions and what we observe or experience.

It must take courage to move here.

It certainly invites some startling questions: suppose we could change those assumptions, would we not see a different universe? How do we alter basic assumptions? We know that education has a very deep effect here, but such a change would take longer than one generation. And to break deep educational bias and replace it gradually with some other assumptions so that we can begin to see new entities is an awfully exciting thing to contemplate and quite frightening as well. I'm beginning to believe that the way scientists are produced, the schools they go through, the precise ways in which they must think and behave if they

are to be scientists tends to insure the continuity and conservation of attitudes already established. Yet the odd scientist who doesn't conform or get stereotyped by this is the innovator. Einstein, for example, didn't carry on the traditional methods; he stood outside the consensus and began to form a new consensus. It has taken fifty years at least for his theories to be generally accepted. As a theoretical physicist, I'm looking especially for larger and larger coherence, more and more unity to be incorporated within these fresh points of view.

You say "unity" which I find very interesting because it seems to me there's quite a difference between "unity" and "union". Do you have any thoughts on this?

Yes. Unity and order are the religion of science. Science cannot exist without the concept of unity. Union signifies the bringing together of separate parts. A new philosophy of science has been growing up rapidly in the last few years on the differentiation of union and unity, to use your terms. The leading philosopher these days, in my estimation, is Michael Polanyi who makes this point very clearly. He has written many books on the subject elucidating this.

Wasn't he a Nobel laureate?

Yes. In chemistry. He was against the popular notion that physics and other basic sciences underlie the understanding of everything. This is the view of reductionism - that everything can be explained in terms of the union of the parts - if you know all about the atoms you'll know all about the molecules, if you know all about the molecules you'll know all about cells, and so on and so on, up to man, and I suppose to God.

Polanyi has made it very clear that one cannot understand anything in terms of the lower elements or the lesser parts of a whole. When an engineer makes a new device he has to use all the elements of physics but what he creates can only be understood in terms of the purpose of that particular device. Unity involves purpose; union is related only to the parts. The physicist cannot, as a physicist, design a device. It's the engineer who does that. Going to the next higher stage, the really important one - which biology is now thrusting home to physicists and which physicists must take note of - is that, with life, we are faced perpetually with purpose. Creations of all sorts and shapes, living entities of all kinds, are designed to do certain things very efficiently and can be understood only in terms of purpose. It is impossible, according to Polanyi, and I agree, to understand a living or-

ganism in terms of the union of the parts. The organism has a unity of its own. Reductionism in philosophy and science just has to depart from the scene and is doing so gradually under the influence of biology - even though most biologists have the false goal of reducing their subject to physics.

How do you believe these changed points of view will begin to appear in thought and experience?

I don't know. But I have a strong intuition that Jesus, when healing the sick or feeding large numbers of people with unusually small quantities of matter, was acting on assumptions utterly different from the ones belonging to traditional materialism, and that we have a great deal to learn from that.

Is there any rethinking of some of the more cherished assumptions that have recently been filling scientists' classrooms? Is the Big Bang still the most cherished one at the moment? Has it been undergoing any re-examination?

I read generally in cosmology because of my early years in mathematical physics. I was very intrigued by an article appearing in *The New Scientist* recently (16 November 1978) called "Is the Universe an Accident?" As the article points out, the Big Bang theory has been getting into trouble on the question of order vs. chaos. The Big Bang, being an extremely hot and violent event, should have been highly chaotic. Yet the remnant of the Big Bang, the observed background radiation, is almost perfectly homogenous and isotropic. No mechanism has been found or dreamt of yet which can explain how so much order could have come out of so much disorder. Also, a number of aspects of the present theory of evolution of the universe requires events with infinitesimal probabilities, such as the formation of cells out of molecules or behaviour out of the DNA code. And recent mechanistic discoveries, such as the DNA code, have led - remarkably - to even greater difficulties for understanding evolution. They've made it more unlikely that evolution could have proceeded via materialistic mechanism. It would appear strongly that order - not disorder - is basic to the whole of creation. A term has even been coined to deal with this large amount of order where there should be a vast amount of disorder according to traditional science, and this term is the 'anthropic principle'.

"Anthropic" - what does it mean?

From the word "anthros" or man, I suppose. It's been obvious to me all my life that the contemplation of cosmology - of the creation of the universe and the evolution of human life - is nothing but a set of concepts arising in human consciousness. And yet we are told that; external to human consciousness, there has been a Big Bang from which has evolved a complex system of galaxies, planets, life, man, consciousness itself. It seems to me the whole thing is backwards. And that we have - in some way completely mysterious to me at the moment - developed evolution, rather than that evolution has developed us. The anthropic principle has arisen from the uneasiness felt by the leading theorists over the extremely remote probability that evolution, as understood, could have produced the known universe and man out of the large number of alternative universes. The term "anthropic" suggests to me that consciousness was first and not last, that in some sense the universe is reflecting the human mind - and yet the human mind is reflecting the universe. It is a very uneasy situation that is developing.

Waiting for the next step in thinking?

I can only imagine that the next step will usher in a pretty wild time as our pre-suppositions are discovered and the real nature of the human mind opens up. A few leading scientists are beginning to suggest that what we perceive is determined by what we deeply believe, and to change this belief means that the evidence will have to change. It seems inevitable that science is now preparing for a great leap - a profound alteration in our way of observing the universe.

## The Universe and the Mind of Man — Which the Reflector?

PROFESSOR GLEN SCHAEFER

Edited version of lecture delivered to  
The Study Society, 26 March 1981

*In the Chair: Mr. William Anderson*

I have had the very pleasant task of introducing to you Professor Schaefer. Glen Schaefer is head of the Ecological Physics Group at the Cranfield Institute of Technology. He is a Canadian who came to this country from the University of Toronto to the University of Birmingham where he gained his Ph.D. He then worked in industry and at Loughborough University, and since 1975 he has held his present post.

He has an enviable range of achievements and qualifications. He is a mathematical physicist; he is also an ornithologist and an entomologist; he is a Fellow of the Royal Entomological Society and a Fellow of the Royal Meteorological Society. He is a world authority on animal migration. He brings together so many different aspects of science and he brings them together, I think, because he has an exceptionally gifted imagination and sympathy. I came across him first because I was fortunate enough to attend the conference on the unifying effect of imagination which was held under the auspices of a body called 'The Centre for Spiritual and Psychological Studies'. This conference was held at Hove last November and it had many distinguished contributors and members attending. There was hardly a talk or discussion I heard there that has not since that time reverberated in me in some way or another. In the final

session, Professor Schaefer talked about his work at Cranfield and I had that lovely experience, while he spoke, of my mind expanding. He managed to give me a feeling in just a few words of someone who could see Nature as a whole, who had a feeling for the ramifications and beautiful networks within the biosphere. I know now that in introducing him I have the pleasure of feeling that you will experience what I felt then and what I am certain I will feel again.

*Professor Schaefer:*

It's humbling to be here in front of this organization. For another reason it's humbling, because I am hoping to give you a brief overview of a number of areas in an hour — cosmogony, the evolution of the universe, the evolution of life and mind following that, the relation of man to his environment, the relation of mind to body, and finally something on higher dimensions. How can I attempt to say anything towards integrating this infinite theme? The answer is: I can't. But I did accept your invitation in the belief that the common focusing of ideas and good-will tonight will create a kind of soil which will allow a few seeds of higher consciousness to germinate. I cannot deal with the subject matter otherwise. To make things even more difficult, this is the first lecture that I have given in this, my third phase of life.

I want to describe what that means briefly. I've almost forgotten I'm Canadian. From age 5 my grandmother and then my parents surrounded me with metaphysical thinking, and I've had quite a few spiritual healings. This was an important element, setting the scene for the rest of my life. From age 10 I became utterly absorbed in atomic physics and mathematics and knew by age 12 what I wanted to do in that line, much to my father's amazement. From age 12 I became absorbed in the environment as well — forests, swamps, birds, insects — I couldn't get enough of them. And finally, at age 15 approximately I knew I would have three careers — mathematical physics first, then biology, and finally metaphysics of man and nature. The first two phases were clearly defined — I made no plans, everything just happened along the way.

I normally lecture without notes, but tonight I am pulling so many things together and they have to be succinct, that I have made some headings. I hope you will excuse that. It will make the lecture a bit rougher.

The Chairman outlined some of my experience in various areas — mathematical physics and quantum physics; ecology; with a background of spiritual healing from young. I hope I am speaking honestly tonight out of that experience. But we have to deal tonight with some other areas as well, where I've had to pick up the currents, like cosmology (which comes pretty easily to a mathematical physicist). I can only highlight the recent-trends in all these areas. I want to pick up the trends in the different areas and bring them together to form some conclusions, which I hope will stimulate all of us. I can only indicate cross-metaphors and linkages as we move towards, I believe, a new science in the next few decades. I want to try to define why we need a new science and a new paradigm, a new conceptual framework. I hope that will be obvious by the end, if it isn't so already. I cannot stop along the chosen route to justify all the statements I'm going to make, but I'd be glad to provide references. (See References below.) I've used sources which I feel are mature, from people who have been in their subject areas at least thirty years. Of course there is a lot of 'metaphysics' in the bookshops these days, purporting to arise from quantum physics and cosmology, but it comes mainly from younger men, often from California; although it is good reading, and exciting, and you think you are on the track of this century, I can assure you that that is often not the case — rather, it is good science fiction!

I'll start by defining our normal conceptual framework in the West. I'll call it the Western scientific paradigm. It is the view we take unconsciously in our every-day life as correct, even though we know — I'm sure people of this Society know in their meditative moments — it is not correct. We believe that there is a thing called 'matter' which is external to us and the basis of all, governed by the laws of physics and the laws of chance. And from the 'big bang' at the beginning of the universe, matter plus physics plus chance have evolved the entire universe, life, man, mind. This is a process which is pressed on us these

days and for several hundred years — the idea that the lesser gives rise to the greater. This is called 'reductionism'. You start with light or atoms and you end up with mind, fighting disorganizing entropy all along the way by an enormous uphill effort. You reduce everything to atoms and then see how it all evolves, all by itself through chance. The result is that we consider ourselves most of the time as a speck on a speck on a speck in an enormous universe, all governed by chance. Therefore there is no meaning whatsoever; this leads to rampant nihilism and to the loss of all ethical norms. Since everything is chance at the bottom, we have lost the desire to control the evil effects of our science and our thinking — things like bombs and insecticides. There is no logical necessity for anything. That I hope is a brief but largely correct view of the Western conceptual framework, or scientific paradigm.

Yet despite all that surely it is obvious to all of us, if we stop to ponder, that our concepts, our ideas, our understanding have created the entire universe that we know, outside of the scale of our bodies. Everything else, going down to atoms and up to the big bang universe is purely creative thought — nothing else, surely. There is no direct evidence. It's all remote in every way; too small, too big, instruments or not. Instruments give only readings, pictures, nothing more. To this extent mind, our own human mind, is greater than the universe. That's obvious. We can penetrate to the origins and causes of things through mind. And yet ... we consider ourselves a speck, with nihilism.

Well, which is the reflector? Do mind and man and animals reflect the materialistic framework of the universe? Or does the materialistic framework of the universe reflect our mind? Both seem 'obvious'. Most of the time we act on the former.

Now my aim in this discussion paper is to see if this Western scientific paradigm really does hold water in the light of the best available information. The answer we shall find is that it holds almost no water at all. That's why we're in trouble, I believe. Two centuries ago, or even up to about 1850, just before Darwin, order and design were thought to be obvious deductions from observations of nature. But order and design went out with a smack when Darwin and atomic physics took over in the

latter part of the century. Surely by now, 100 years on, we have detailed foundations for our materialistic Western paradigm. Surely there can be no longer any thought of order and design in the universe; the paradigm says that there isn't.

Yet, in the last few years, out of the very details of cosmic evolution and the details of the genetic code, and so on, has come the realization, but only to the minds of the few leaders of these fields, that there is an essentially perfect order and perfect design, demanding an intelligence behind evolution. There is no escaping it, I believe, and I'll take these subjects one by one and show you why that is the case. Anyone who can penetrate to the forefront of these subjects will see it. A new paradigm is required. Of course it's felt in many ways other than intellectual, by many people at different levels. It's coming out in poetry and in art and in the study of the paranormal.

The birth of this new paradigm which is now just starting will be painful, no doubt. Any change of conceptual basis will be quite traumatic. Let's hope we survive it. I wouldn't like to say whether we'll get through it or not. By the end of the talk, when you've seen the amount of intelligence behind things, I have a feeling that you will share my faith that we'll be protected from our own folly.

These new images are coming largely out of the deepest science, out of the few minds at the head of each field. It is through persistent digging that the new images are being found which will arrest the materialism of the previous framework and reverse it. I believe that the new paradigm will come out of the Western tradition. At the moment there is a swing towards the East, even among the young physicists. But I think it will not come out of the East; they've had three or four thousand years. The Western tradition has always had two sides instead of just one. It has had the inner: theory and concepts; and it has had the outer: application. It tries to deal with things and it tries to think into things; not just think into things. It tries to balance idealism with realism, but not very well so far. I believe there will be some hints tonight to show you the kind of paradigm we'll have to arrive at.

Let's start with cosmogony. Here, we've arrived at the 'big bang theory' of the universe, which you hear about every day.

Surely it explains the origin of everything. It is based only on the laws of physics and on chance, and away it goes and you end up with man and mind at the other end, after enough billion years. Surely it shows us how everything originated and evolved and how we got here. So it is being taught. So it is being displayed on television. Let me briefly outline the big bang theory of evolution (Ref. 1). It says that at time zero there was an enormous explosion of immensely energetic light compacted initially to minute volume at billions of degrees of temperature. It continued to expand and cool rapidly. After a few millionths of seconds condensation started, in the form of particles of matter precipitating out of the light. All was chaos because of the enormous temperatures and the violence of the explosion. That was our beginning — chaos and violence. It probably expanded to galactic size within a year. The gases of hydrogen and helium wouldn't be uniformly dispersed in the hot chaotic expanding gas. There would be some regions by chance which would have higher density than others. The local gravity would tend to pull those together, and so galaxies condensed here and there, islands in the chaos. As galaxies themselves began to contract under gravity, there would be islands of higher density by chance which, because of their own gravity, contracted into stars. The stars attracted gas from around them and for a thousand million years became heavier. Some collapsed and exploded — super novas. In the explosion, nuclear fusion events took place which created the heavy elements out of the lighter elements. So we got carbon, oxygen, and the heavier elements, which were essential for our formation later. We came out of stars.

Planets condensed out of the gaseous material around each contracting star, and moved in orbits. As they cooled, water and rocks condensed; there was lightning and violent storms. Out of the lightning flashes and the hot volcanic soups various organic and biological molecules were born. From these molecules, by sheer chance, given enough billion years, the first cell emerged and then by Darwinian processes the plants, animals and man. As a last flickering in this long story came consciousness. (Laughter). I'm talking to a Society of course which can laugh at this point. It's about the only Society that

would! (Laughter). So that's the end of my lecture; there's no point in going on! (Laughter).

That cosmological and biological story has been created by something like ten thousand scientists, all believing it and working feverishly, with thousands of papers a year giving immense detail. It is only with such detail available that it is possible to investigate the materialistic paradigm for internal cracks, and this can be done only by the top minds. Let us start with cosmology and then later turn to biological evolution.

Buried within the big bang cosmology are the recently noticed remarkable coincidences. (Ref 2). We're talking first about the cosmos before the earth was formed, the large scale universe. First, there is exactly the right rate of expansion of the universe. If it had been slower, it would have fallen back in upon itself under gravity, and there would have been no time for evolution. If it had been faster, nothing could have condensed. In both cases no stars, planets, life, mind. The rate of expansion is precisely correct, for these to form. Well, maybe just a coincidence. According to the theory, if you go back to the first few seconds of the universe, when it was expanding rapidly, if you change the expansion rate by only one part in a million million, the rate would have been too slow or fast and you couldn't have the present universe with life. That's how remarkable the coincidence is. We have just the right expansion rate to create galaxies and stars and planets and us. Amazing! One part in  $10^{12}$ , if you are used to numbers. I'm going to write that down because I want to give you some big numbers in a minute. This is only a million million. (Laughter). That small fraction ruins the whole story. All right, so we're lucky! (Laughter). Maybe you think your life is not worth living (laughter); maybe we're unlucky! Possibly the universe has been through that many big bangs and at last one was just right. (Laughter). These are the kinds of thoughts going around.

Secondly, the universe is too ordered. It came out of chaos — high temperatures — and yet when telescopes look around the universe for what is called the background radiation, the amount coming from any direction in space is exactly the same as from every other within one part in a thousand. It shouldn't be so smooth. How could so much order come out of so much

dis-order? Well, that's causing serious thought among the few who think about their subject; most people don't think of course, they just do their subject.

Again, the forces which hold the nucleus of each atom together are just right; if they had been one per cent stronger you wouldn't have had anything other than hydrogen and helium and no life. If it were just one per cent bigger you'd have enormously heavy elements, and it looks like life could not have evolved. The strength of electrostatic forces — between electrons and protons holding atoms together — is just right also. If you change that by about one per cent you couldn't have complex molecules needed for life. More precise coincidences? And so it goes on, through many features, all having to be nearly exactly right to get *us*. These things are rarely said of course, and they're not in book form yet, being only about five years old.

So the possibility of the cosmos evolving towards life depends upon a whole series of remarkably sensitive and coincidental number values, and in order to preserve the story a few people who realize this have had to introduce a new principle alien to science, to ensure evolution by overcoming the coincidences. It's called the *anthropic* principle. (Ref.2). You'll hear a lot about it I'm sure in the next five years. You've got to add this principle to the materialistic Western Paradigm in order to account for us at all, in order to have a conscious observer at the end of the evolution, who is able to look out and say 'Yes, I can conceive of and understand the universe'. No-one has any idea what it's based upon, but it's got to be brought in, even though it crumbles the Western paradigm seriously.

In some sense the anthropic principle says that the end of everything was in at the beginning, and the beginning is in at the end. There is one web. Was there ever a beginning? Maybe we'll discover one day that there wasn't, but that's not the conventional view, well-founded in the minds of most scientists these days. Most astronomers and physicists have not yet heard of these matters; the people who talk this way must be going senile. You see, you don't get to this kind of stage until you're in your forties or fifties (laughter), and the conventional story is that you can't contribute anything beyond about 28 — if you

haven't done it by then, well nihilism will get you (laughter)! But awareness of these matters is transforming the lives of some leading people.

Let us consider next the dust and gas between the stars. It was thought to be mainly single atoms. Then fifteen years ago Hoyle and co-workers found that it was organic matter (Ref.3). It was complex organic molecules, not just atoms! Then more recently the same workers are finding that it's even bio-organic. There's life throughout the entire universe. These are very basic forms of life, virus-like; but they're very complex compared to organic molecules, which are themselves extremely complex compared to single atoms. Now, if you have the sort of mind, one of a few dozen on earth, that can do mathematics as well as physics to a high enough level, you can calculate, using the received theory, the probability that hydrogen atoms and carbon atoms and others, floating in space after coming out of the big bang and stellar explosions, could actually, over time and by chance, get together, glue together, to form one of these molecules. Allowing for the ten thousand million years of existence of our universe, and for gas anywhere in the universe between the  $10^{40}$  stars, the probability that you could produce even one organic molecule, let alone a living thing, by random events according to Hoyle is one part in about  $10^{200}$  (Ref.4). The power 200 is accurate to plus or minus a hundred, say. Now, the number of protons, the nuclei of hydrogen atoms in the entire universe, is thought to be about  $10^{80}$  which we think is an ENORMOUS number, until you see these probabilities. You then say to yourself, that equals zero; there's zero probability by chance alone.

I ran into these numbers about ten years ago and they completely changed my view of my subject (Ref.5). Now when you come to considering the first cell in the hot soup with the lightning flashes, to form a cell, which is IMMENSELY complicated compared to any virus or organic molecule, the chance probability is ten to the power minus 400 or 600 — meaningless (Ref.5). The logic of the cell, let alone the putting together of the stuff, is fearfully complicated. We can reach these estimates only because we know the details now, just when we thought we had the genetic code which was going to unlock everything.

You needed the detail, you needed to go through your observations under the influence of materialistic thinking, looking for the materialistic origin of things, to realize (in the best minds only so far) that you can't have that materialistic view — it's the end. And so Hoyle, for example, was saying so on BBC Radio 3 (Ref.4). It was very surprising to hear him say this, because his books have been materialistic and anti-religious. His thought is now quite different, and he's now looking for the intelligent source of information which must fill the universe, against which natural selection can work. He said he is going to spend the rest of his days seeking the nature of the 'invisible hand'. Intelligence must dominate; you can't think of it in any other terms but intelligence. Information, intelligence, must dominate the entire universe and the whole of evolution — not just a bit occasionally.

Let's now turn to the evolution of life on earth. Well, if the above is true, then it's unlikely we'll see any evidence that chance plays a part in evolution. Now neo-Darwinian theory, a solid plank in the Western paradigm, says that living things evolve by chance mutations in the genetic material followed by natural selection. There's plenty of evidence around, in the laboratory and in the field, that the second element, natural selection, takes place. You can see things being changed; man selects dogs until they are as big as horses or as small as mice. Nature selects as well; you can watch that going on, but that's natural selection, it's not the evolution of species. No-one has got a solid shred of evidence (and I think this is absolutely correct) that any species has ever evolved to another species. The record is blank. Lots of change within species; a smaller horse to a bigger horse to a bigger horse, but still a horse. Also, there is no shred of evidence that mutations are effective. I tell that to my students, but they begin to discredit me on just about everything else, because this is a sacred fact of education — so I have to be careful and let them have another twenty years.

Still on biology, I would like to tell you some remarkable facts from a study of homology. You know that the bones in a bird's wing have the same relationship as those in a horse's leg or a man's arm or a fish's fin. This is called homology. Surely they all had a common ancestor possessing an appendage which

evolved into all these similar structures, by mutations of the the ancestral genes. Surely . . .? Homology was deeply studied long before Darwin, more than today. Your poetic friends of the transcendentalist movement near 1800, as well as all the transcendentalist biologists, knew all these things. They saw order and design everywhere in nature and they thought homologous structures were the expression of archetypes maintained by platonic ideals. These were governing evolution; order came from a mental level. Darwin's conjecture put an end to that, and now we're just becoming aware of it again.

Let me give you an example from a wonderful booklet called *Homology: An Unsolved Problem*, by Gavin de Beer, a famous living Darwinian (Ref.6). In terms of materialistic genetics, you'd expect to find some common gene characters in the germ cells of birds and fish and man and horses, giving rise to the same structural homology. Well, when you look for it in detail, you can't find it. The homology is not reflected in the germ cell, nor even in the bio-mechanisms which produce the 'arm' during growing up. It appears that genetics cannot account for evolution as was hoped.

Here is a seminal example from the same source. Consider the fruit fly, the most common animal for genetic experiments. Take fruit flies that are eyeless; they occur from time to time, and have identifiable genes. Collect a lot of these and put them together and breed them, inbreed them, and their offspring have no eyes. But, after a few generations of inbreeding, some have eyes again! When you check the genes, they haven't changed at all; they still have 'eyeless genes'. What has happened is that some other genes associated with other things, have got together and formed a new complex to override the 'eyeless gene', to make sure that the animal has eyes. This is really astonishing. Nobody can explain it, even though de Beer has been asking the question for 30 years. To my intuition the lesson is clear. The genes and the functions and the bio-chemistry of the body are not controlling us in any sense whatsoever. Something else is controlling them. They are only servants to create pathways. They are plastic; one gene or a group of genes can apparently get together to make sure that something else gets done. There is no genetic code controlling

my growth and my behaviour. Explosive stuff! The external universe is plastic. Something else is using the plasticity, including that of our brains, moulding it to achieve certain functions, like seeing light. That's more fundamental than genes. Genes are sub-serving. The archetypes are beginning to reappear as the dominant force. They are mental or spiritual — I won't discriminate here. Matter and its motions only provide the pathways to make sure things get done or happen.

We come now to man and his environment, and I want to show you how we depend on insects and they depend on us. We normally think of insects as something you step on, squirt, mass-kill. You do it without thought. It's external to you, you don't understand it or you fear it, so you kill it. Let me show you how interdependent we are. Using slides, I'm going to describe the one insect, the spruce budworm moth, which is the manager of the entire boreal forest of Eastern North America. Not man — he has little clue. I've been deeply involved in this research. This slide shows eastern North America — Newfoundland, New Brunswick, Maine, Ontario and the Great Lakes. There are two hundred million acres of natural forest, from which some timber is culled for your newsprint and toilet paper. From time to time the budworm explodes in numbers, and in this big black area covering most of the region the trees are dying because many larvae eat the buds. In the next years the plague, so-called, dies out. In another five years it is virtually gone everywhere, except down here in New Brunswick. And that's the only area that has been sprayed! Continuously from 1949 when an outbreak of defoliation first hit. In New Brunswick over 50 per cent of the inhabitants rely on the forest and its products for a living. They said: 'Look, the spruce budworm is destroying our forest. We must have our timber industry — shoot it with DDT'. And lots of other things since. They've been at it for 32 years! The infestation has been perpetuated by the act of spraying. How can that be? By killing high percentages of the larvae every year, you have more there now than anywhere else? Now that is outside the Western paradigm! The paradigm says man has dominion. Be careful, you might fall for this on religious grounds. Man has dominion. He goes along, he uses his brain instead of his mind — it's only got

fluid in it — and he says: 'I'm in command and I'm going to bring my technology and I'm going to squirt and kill the hell out of all this.' And lo and behold it's the only place where the insects keep going. This was the first large-scale spraying project that got into this problem. Now, with every major crop in the world, the story is the same. The more spray we use, the more insects we have. This is due to chemical resistance and to the parasites and other natural enemies being knocked out faster than the so-called pest. We've got ourselves painted into a corner. It is so bad in New Brunswick that biologists and foresters even invited some physicists — me and my team and radar for four years — to find out what is going on and how to stop it.

Farmers are down to the last few effective chemicals because insect evolution, that is to say adaptation by natural selection, can proceed faster than the inventiveness of all chemists. We push Nature hard with our stupid Western materialism, with its sense of dominion. We squirt the hell out of it and, lo and behold, we get into the impasse because plastic Nature finds another pathway. As with the genes, it finds another route to achieve that which it has to achieve. Behind is a hidden intelligence, thank goodness.

For the last twelve years I've been pursuing insects with radar all over the world starting with large desert locusts in the Sahara. Then we went to cotton bollworm moths in the Sudan. Then down in size to the spruce budworm moth — the species I've been talking about — one centimetre long, the manager of the eastern North American forests. We went to Australia and worked on the plague locusts in the desert. Now we're using radar on aphids, two millimetres long, in relation to the British wheat crop, worth a billion pounds a year. The aphids are using about 10 per cent, a mere 100 million pounds, and we get a few thousand pounds for research! (Laughter). Such is Western thinking! (Laughter). The topic of greatest importance, agriculture, is the least funded! So we have to keep costs extra low or nobody will buy the research, very urgent research, since our food supplies are at risk. Fortunately, chemicals are now being seen as a scarce resource, not something you mass-produce and squirt around; the insects have taught us that.

*(Slides were shown at this point, of insect migration as seen by the radars developed in my laboratory. The chief points may be found in References 7 and 8. Insects move mainly at night, at high altitudes and long distances. They travel independently, but within each species there is a common orientation during flight, even on the darkest of nights. Wingbeat frequencies can be readily detected, aiding identification. The breathing of larger insects can be observed at distances of a mile. Their great mobility and sudden appearances make crop protection difficult. The great influence of meteorology on their movements and on the rate of population growth means that future 'pest' problems cannot be predicted reliably any more than weather forecasts are reliable.)*

Now what are we going to do about all these unpredictable insects and the spraying that is becoming less effective? The more you spray the more insect problems you have. What is a better method? I liken an excess of insects on a crop as a disease on the body of Nature, and I liken treating the body of Nature with chemicals to feeding the body of man with medical chemicals. We know that doesn't work much any more. We've run into side-effects. Everybody is getting afraid of side-effects, and they are very serious. Here too we've got to think of other ways. Holistic medicine which includes the psyche is growing and being tested; every thinkable combination of mental and chemical methods is being tried, once again after about a century of quiescence, whilst medicine went all chemical under the Western paradigm. What can we do with environmental disease I wonder, other than chemical spraying? First, we can cut back on dosage. I've devised methods where we use only a tenth the dose, which is good for nature and pollution; it works, but can only be short term. Biological methods like using pheromone (sex) chemicals are ineffective so far. Why should they work? Nature has many a pathway — it can find a hundred different ways of getting to the same point. In my opinion, this is the conclusion coming from these attempts, as well as out of homology as I mentioned, and out of cosmology.

Let me show you what I think is the way ahead, sooner or later. We've got to use the fact (to me) that there is intelligence behind all manifestation. I wonder what influence mind has on insects. To me, this is the key question, to which we need an answer within the decade.

But first, what influence has mind on matter? I will consider only a crude but stunning phenomenon from parapsychology. Can everybody see that I am holding a bent piece of metal? It was bent by a child sitting some metres from it, under T.V. surveillance and with chart recorders and electronic this and that. There are hundreds of these now. We could talk about Yuri Geller, but I will keep to the children, mainly 8 to 10 years old, when they're at their best. That was a straight piece of toughened aluminium, some 10cm x 1.5cm x 2mm. I could bend it, but I would have to use most of my strength. This piece bent in the interval between two frames of the television camera, which are 1/50 second apart! There is no machine that can bend that piece into that shape without cracks and deformation, which this piece has not got. Also, crystals disappear out of sealed boxes or half a crystal goes, being found later in another part of the room. This is quite staggering when you first run into it and I've spent a few hours with Professor Hasted at Birkbeck College, in his workshops where the children perform, and I'm convinced. His book on metal bending has just come out (Ref.9). Nobody has an explanation — it's outside physics. Mind and matter — just a crude example to introduce you to the central crunch of my talk. Once Hasted hears of these children he visits and lives with the family for a few days. They have to become friendly or it won't happen. I think that gives hope that it would be difficult to misuse it. The best metal bender is not a child; he's a Frenchman about 60 years old, not quite senile. (Laughter). He can bend aircraft aluminium bars of 1" square section — not far but they do bend. Hasted is one of the leading experimental physicists in Europe. Here are the criteria for success in this trivial, stunning undertaking. Trivial, because think of the potential. See whether you think the criteria are respectable or not, or whether you want to ban this activity. The criteria are based on years of experience by Hasted, Bohm and their team (Ref.10):

'Psychokinetic phenomena cannot in general be produced unless all who participate are in a relaxed state; a state of tension, fear, hostility, on the part of any one of those present generally communicates itself to the whole group. The person who produces these phenomena must be considered to be one

of the group, actively co-operating in the experiment, not an instrument or a machine. The entire process goes most easily when all those present actively want something to work well. But the attempt to concentrate strongly in order to obtain a desired result tends to interfere with the relaxed state of mind needed to produce such phenomena. (You can't concentrate and get it. It happens when you're not thinking about it). Once the intention to do something has been fairly established, the conscious functions of the mind, insofar as they have bearing on the goal, tend to become more of a hindrance than a help.'

How is all this related to insects? What are the conditions necessary for us to interact with the environment through mental means? Blake has been a great help to understanding. I was in the Tate Gallery wondering as usual how to do something better than to spray hell into the environment. I was wandering through the great Blake Exhibition two or three years ago, when I saw a little thing called 'The Ghost of a Flea' — just what I needed, the spirit of an insect. It bolted off the wall into my mind, because the flea was in *man* form. It didn't have six legs, it had arms and two legs, but it was devilish. (Figure 1). It had a bowl in one hand for blood — fleas are blood-sucking parasites at the present time — and it had a prick in the other hand to secure the blood. I was helped immensely a year later when I read what Blake said about this picture (Ref. 11). Varley, his friend, asked Blake 'What's all this about?'. And Blake told his friend Varley that when he had this strong vision, the flea told him while he was drawing it, 'All fleas were inhabited by the souls of such men as were by nature blood-thirsty to excess.' Nature is the image of man's thought. Here we have an excess of a certain mentality exemplified in a blood-sucking thing 'out there'. Who knows what that thing would be like if we could redeem ourselves from that image? Remember, all vision is known to be psychological in the last analysis. There's nothing 'outside' other than images of our collective mind — but I'm not going further into that tonight.

A little later St Paul helped me to make an important connection, which I think can help form a new paradigm and also help to heal Nature. He says in Romans 8: 'We know that the whole creation groaneth and travaileth in pain together until now.'



Figure 1 *The Ghost of a Flea* by William Blake. Tate Gallery



Figure 2 *They came when she called* by Liz Underhill.

For the earnest expectation of the creature waiteth for the manifestation of the Sons of God. The creation also shall be delivered from the bondage of corruption into the glorious liberty of the Sons of God.' Phillip's translation says: 'The whole creation is on tip-toe to see the wonderful sight of the Sons of God coming into their own.' *We* have got to change. We'll never get anywhere by pumping chemicals into ourselves, by thinking the universe is based on chance and material law, by squirting insects. It's we who have to change. We are learning, I believe, from deep cosmology, deep biology, deep artistry that what we see is mindlike, and probably our own collective thought. Therefore we must change. How to become a Son of God, if you like, in Paul's language?

Consciousness. What is the good of becoming more conscious if the stuff that pours into consciousness is of two types, one type producing bombs, the other type producing poetry, just to exaggerate both ways. How do we discriminate between the illusory and the true, between the good and the evil thought? When it comes, it is not we who create the thought. You generally think you're thinking, but you're not. It's pouring through us and how do we discriminate when it comes, and choose and emphasize? This is rarely done, including science. Ethics will become a key factor in the new paradigm, in the new science, or else we perish.

The final slide shows another view of insects. This original painting is called 'They came when she called'. (Figure 2). That's the kind of approach we need — empathy, observation, learning to appreciate, to understand. As we transform ourselves we'll see a transformed environment. Look how the woman transformed herself: her antennae artistically interpreted; look at her butterfly forms. It's another vision of the insect world, this time of butterflies, which we all love for some reason.

I didn't have time to tell you how important insects are to man. The flowers which we love were evolved for insects, or to put it more correctly, express the intelligence which allows insects to find them, for their mutual benefit. That's another view of a flower — an insect view. We could talk about fleas. It's interesting to see what Varley says about fleas (Ref.11); they're

elegant, they're elastic, they jump fantastically. They're the sign of Gemini — watch out for any Gemini here (laughter). I won't tell you what I am!

Finally, the new science must take account of the immense intelligence behind everything. Chance plays no role; coincidence is not what it seems. What we usually think of as the universe — our vision — sometimes resembles that which we don't like, but when we alter that, we shall have a new vision. Order, mind and its influence, the central intelligence — let's alter our vision and see it.

### Question Time

Miss S. Does Professor Schaefer connect what he has just been saying with the success of faith healing?

Prof.S. There is a resurgence in faith healing. The early centuries of Christianity were full of it, but that got organized and diluted, with a surge again in the nineteenth century. I have no doubt these are genuine effects. But we have to be careful to discriminate the types of metaphysics that are being expressed. At one end of the spectrum you can have strong physical effects through hypnotism, when one person gives up his mind to another simply by suggestion. I think that is not worth having, but it is powerful if you yield to the suggestion. And at the other end you have the remarkable healings of a man called Jesus, which I would call spiritual healings; in recent times there have been a few people approaching that. Faith healing is a phrase which can span the whole spectrum, and can be a mixture of philosophy, suggestions and truth. We must discriminate more in the years ahead because suggestions can have negative effects, evil effects.

Miss S. I was thinking from the point of view that each unit in the body could be analogous with one of these creatures that you talked about, and how we could influence it.

Prof.S. Oh, yes indeed. An analogous example I've often used

when teaching children is the willed movement of my index finger. When I say 'my finger is going up right *now* it is not going down now, or now, but *now* is going down', that is a miracle. It's a miracle on exactly the same level as the bent metal. The only difference, I believe, is that we consider the metal is more external to us and therefore less capable of being influenced. Starting the action of the brain and nerves is no different, I believe, except that our paradigms for millenia gave us the faith to allow that to happen easily. But sometimes we lose the ability to use our fingers and then we have to get the action back again and that is where faith healing can be used. It is no different, but it is much more important. The bent metal should not be amazing, but it is just as amazing because nobody can understand the connections between the mental event of intention and all the rest that proceeds. Of course, once you get the electrons flowing in the case of the metal, or the waves set up in the brain in the case of the finger, everything else can be traced by the paradigm; but the connection at the start is a miracle. The future will unlock the science of mind.

Mr.A. Professor Schaefer, you talked about the enormous amount of evidence showing an intelligence behind everything in the universe. In your experience, what evidence is there for what the intention of this intelligence may or may not be, as viewed by science?

Prof.S. I think no one in science could answer that. You've got to go deeper than science. Science is based upon the search for order. You have no science if you don't have that goal. Every scientist is a religious person, whether he knows it or not, because he is looking for order. But what is the nature of purpose — you say intention? That smacks of a sense of time. We are bound up with time, with everything changing in time, but time is only something derived from our vision. We see things change and we say, 'Ah, there is a sequence, that is time'. There is a beginning and an end. And there is space everywhere. But space and time are now known in physics to be derivative concepts. They are not the stage on which phenomena play. Intention, purpose are mind-like, and so a part of metaphysics, a subject I shall not enter upon at this time.

*Dr.C.* So far you seem to have studied material science, and you've not really read very well the intelligence behind that material outlook. When I deal with a patient, one sometimes gets the sense of an intelligence which is behind the scene, and translating various events which will occur in a certain time. Understanding that intelligence helps one to support the sequence of events in an appropriate fashion. I wondered if you could say anything more about this comprehension of the nature of the intelligence.

*Prof.S.* Let me note that what is coming through these few people in physics and biology, and a few in psychology as well, concerns intelligence behind the universe of appearance. I don't think that that is really 'intelligence', it is only a very limited, finite mortal view of the one intelligence. It is a pseudo-intelligence, connected always with pieces of matter, limited by our vision of the things we see, the so-called external universe we study. But that is a very tiny part of the universe.

I've just interviewed a leading theoretical physicist, Professor David Bohm of Birkbeck College, University of London, for an international newspaper series (*The Christian Science Monitor*), the series in which I was interviewed, and which you may have read. We talked about how much energy there is in the universe, the total (invisible) potential energy, compared to the energy visible in the form of matter. Matter is congealed energy. The amount of potential energy in a cubic centimetre of so-called empty space, the vacuum, is immensely greater than the entire energy content of the visible universe! So matter is TRIVIAL! And the 'intelligence' which we associate with that trivial matter, which expresses itself as ' $10^{-200}$ ', must also be a trivial aspect of one intelligence. In the years ahead we will have to distinguish these even more carefully. Physics has shown that all matter is born from the vacuum; some is fairly stable while some comes and goes in flashes. It is also very 'plastic'. We shall need to learn what governs its birth, its appearance. In my view this will be found to be thought (of some kind).

Let me put the last paragraph in other terms. The intelligence behind our everyday material universe and the thoughts that go with it — the thoughts that are it, in my view — may well be the

Collective Unconscious of Jung and others; and that is almost trivial compared to the one intelligence, the source. The former manifests evil as well as good, it delivers truth as well as error, because of its extreme limitation. And that which is must be harmonious or the whole thing would have fallen apart billions of years ago. Everything we have been hearing tonight, from the frontiers of science, is really only on the level of the collective unconscious. Even that has fantastic intelligence, but it is far from perfect. It contains fleas that suck the blood of others, instead of the harmonious flea. You say we have been ennobled. If that's ennoblement, we still have  $10^{200}$  more ennoblement ahead of us! I believe that even a microsecond of consciousness of the higher level, of the next dimension up, which is infinite compared to any sub-dimension, a micro-second view of that will completely heal, redeem, allow walking on water, (even bend metal). This exceeds by far the lesser dimensions of intelligence which contain errors, giving atom bombs as well as ploughshares.

*Mr.S.* How do we perceive the change in paradigm coming about?

*Prof.S.* I think it is happening around us already. Bent metal, even on Page 2! What effect it will have I don't know, but it is trivial. Faith healing is springing up profusely, with a spectrum of techniques from biofeedback to the spiritual. I've told you already about conceptual science. Unemployment seems to be destructive, giving pessimism. It is all too easy to yield to the suggestion of unemployment — how can there be unemployment when there is more energy in the vacuum in a thimble than in the entire universe of matter? We haven't tapped it.

We will tap it as soon as we have love — that's what I was getting at tonight. Love is behind everything — I didn't want to use that word in my lecture. If you look carefully, love is intelligence. There are many levels of love. But the most perfect kind of love casts out fear, is intelligence, and then watch out for what happens around you. It will always be good.

*Mrs.C.* You mentioned an age group, children between 8 and 10 years. It immediately seems to suggest that the whole tenor

of education through the ages has been entirely wrong. Have you been able through your experience to think of a new direction in education?

*Prof.S.* I hope all of us have taken a step in that direction tonight, and the effects are bound to flow out. I don't think we have to form a committee and get after the headmaster and spray him. (Laughter). The metal bending children and groups did not concentrate, did not need knowledge. The effects arose from respect for all plus expectation. Even these trivial lessons show there must be sympathy, empathy, love, within a group or life doesn't work. Future education will teach a higher state of consciousness, achievable through love and feeling and empathy and poetry, and a deep study of nature. It will teach that such consciousness will have strong beneficial effects, through expectation of their manifestation. That's where the power comes from. Not by willing, not by saying what should happen — we are not the source — but by expecting higher intelligence to pour through, and then never being amazed that a 'coincidence' arises. A study of coincidences alone will soon show that there is intelligence behind things.

*Mrs.B.* Would you say that what we need is to get rid of the man-made laws? We seem so enslaved by man-made laws that we have lost what we should have in connection with the natural laws. I feel that God is not mocked and we seem to be in peril because of too many man-made laws.

*Prof.S.* Not necessarily man-made — this is the unconscious. Too many assumptions, rather than laws, have been handed down and reified by education and now the media. But they will disappear. There is really nothing to worry about. The amazing intelligence behind us is breaking in. That's why we're here discussing it.

*Dr.B.* How are our crops going to be saved?

*Prof.S.* I don't know. The creation groaneth for us.

*Chairman:* You referred, Professor Schaefer, to the biologists of the Transcendental School and the poets of that period, in the great period of biology and discovery that preceded the

coming of Darwinism. One of those poets and biologists is Goethe, and one of my favourite thoughts from Goethe that I've been repeating to myself recently is from a poem of his called 'Inheritance', when he says that the most desire-worthy vocation is to mark out, or to delineate, new paths of feeling for noble souls. Now, I think you have done several things: you have made us feel nobler than we knew we were before, and you have also done far more than sketched out the paradigm of the new science: you have made us feel what it would be like really to think in a different way, to have a different attitude to nature and to ourselves, and to feel integrated and at one with the Cosmos in which we live.

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**Appendix A:**  
THE NEW PARADIGM

When the astronomer Laplace explained his system of celestial mechanics to the Emperor Napoleon, he was asked by Napoleon where God fitted in to his view of the universe. He replied proudly 'I have no need of God in my hypothesis'. It is an anecdote that sums up one of the most prominent features of the Western scientific paradigm since its origins in the seventeenth century; the need to overcome the fundamentalism and superstition of the past by rational explanation of causes and effects that has led to what C.S. Lewis calls 'the disgodding of the universe'.

There is a fundamental contradiction in the current western paradigm. On the one hand we have the practice of scientific observation conducted in the belief that absolute truth is within the capacity of the human mind and that order can be found in the physical nature of the universe. On the other hand we have the interpretation of those observations on the basis that the universe and everything that it contains, including the mental processes of its observers, are the products of blind, mindless, chaotic chance. This is a contradiction that may be in the process of being resolved through the appearance of a new paradigm of knowledge. The term paradigm which derives from the Greek word for pattern, *paradeigma*, has been employed by historians of science to describe the complete framework of ideas and assumptions within which a particular epoch or civilization conducts its philosophical, metaphysical, or scientific enquiries. Thus within each successive paradigm from those of the Ionian philosophers, the Academy of Athens, the Hellenistic World within which Christianity arose, the

medieval geocentric universe and the Copernican view of the solar system which supplanted the last, there have been paths of thought which were legitimate to follow and alleys of superstition denied to the respectable. Thus Giordano Bruno was burnt at the stake in 1600 for maintaining, amongst other heresies, the idea of the plurality of universes, an idea which, two hundred years later, as the nature of galaxies came to be grasped and understood, won universal acceptance.

Similarly, for over a hundred years now, it has been impossible for a scientist, however certain in himself of his private beliefs or faith, for his findings to be interpreted by the scientific community in the light of a spiritual or intelligent immanent cause or ordering mind. There has been no place in the guiding tenets, the habitual language, or the attitude to nature of the scientific community for such an interpretation. A scientist might draw his primary inspiration for his researches from the depth of his faith as did Pasteur, but that aspect of his work could not be assimilated with the adoption or influence of his theories and the practical effects that followed them. He might find solace, as did Wolfgang Pauli, in the company of artists, philosophers, or theologians but he would always be powerless against the faith of unfaith, that curious amalgam of neo-Darwinism, reductionism, and materialistic thought, which has been fostered for so long in academic and scientific circles.

According to the doctrines of this faith every physical and mental event must have a mechanistic origin or explanation. It was the rise of mechanics together with the application of Occam's razor in the fourteenth and fifteenth centuries that removed first the angelic hierarchies as essential causes from the universe and then led over the centuries to the situation where the scientist could see no reason for including God in his explanations either.

A modern Laplace, if he were able to find a tyrant today as intelligent as Napoleon, would have to tell a very different story because we are now seeing the start of a great change, the beginning of a new paradigm. This issue of *The Bridge* contains the text of a lecture delivered to the Study Society earlier this year. It is probably the most important document to have appeared in our pages. Here Professor Schaefer demonstrates how, on the

basis of the very analytical, mathematical, and observational techniques by which Western science has progressed for so long, it will now become imperative for scientists to take into account a guiding intelligence underlying the manifestations of creation on all levels from the infinitesimally small to the universe as a whole. The search for order has over the years led to remarkable individual discoveries such as, for example, the discovery of the atom and the ensuing history of nuclear physics but these phenomena have generally been interpreted as arising from chance concatenations of events. That search is now in nearer sight of the objective unity on which true order depends.

The implications of the coming changes in the thought and attitudes of mankind that will be induced by the acceptance of the doctrine of the guiding intelligence are immense, even when considered on the scale of historical time. There is not a field of knowledge currently practised that will not be affected or even revolutionized. Where the men of science have in the past investigated matter and its organization, they will now have to study both matter and its organization as the product and effect of an intelligence, or perhaps, of grades of intelligence, greater than their own. Philosophers and psychologists will now have to envisage the human mind — not as a closed system whose workings are to be understood only in terms of reflecting transient urges in a transient individual body — but as one of the supreme creations of the guiding intelligence. Biologists and ethologists who have for long had to take into account the inventive and creative capacities of man will now have to understand both themselves and the living objects of their study as the creations of an immense and ever fertile imagination.

It is a realization that will bring changes to every side of life in future years because it fundamentally changes our view and knowledge of creativity. The artist will no longer be seen by others and by himself as a gifted crank but as someone who echoes in his work the spirit of creation in nature around him. The artist and the scientist will move closer and closer together in their attitudes and in their use of the imagination, both seeing the creation as did Cristoforo Landino, the Renaissance

humanist: 'God is a poet; and the world is his poem'. Anton Chekhov, who as a trained medical man and a playwright combined in himself the scientist and the artist, wrote in one of his later letters:

Modern culture is but the beginning of a work for a great future, a work that will go on, perhaps, for tens of thousands of years, in order that mankind may, even in the remote future, come to know the truth of a real God — that is, not by guesses, not by seeking in Dostoevsky, but by perceiving clearly, as one perceives that twice two are four.

It would seem that this new perception may be not so long delayed as Chekhov thought. If the implications of the idea of the guiding intelligence are thoroughly assimilated, then religious teachers will no longer have to strain the limits of faith by appeals to dead authority because they and their followers will share the perception that Chekhov described.

Another field that will be changed is that of education. Great educational innovations are inspired by ideals of what man may become and be, by visions of the realized potential of the human mind, heart, and body. Even amongst the best of educators today there is an aimlessness that dissipates the benefit of their good intentions, or else their aims are too short term, too narrowly social, and lacking in inspiration. To take one example, a concern for the environment has been a welcome innovation in the curriculum in recent years but without a feeling for nature as a whole it degenerates into sentimentality or a depressing catalogue of examples of pollution. To present children with the works of nature imbued with the cunning and skills of a guiding intelligence, to reveal to them the marvels of ecological balance as the production of a master playwright, to show how they themselves as human beings must have a role to play in understanding and working in accordance with natural laws, would be not only to transform and enliven their attitude to the environment but to give their studies also a new vigour and practicality.

Education is, of course, one of the chief areas by which the new paradigm will affect the mass of the population. Another will be medicine which has been so deeply affected by the

mechanistic philosophy behind the sciences on which the medical profession draws. Here again, the rebirth of the concept of natural law may lead to a startlingly different approach to health and disease, one in which doctor and patients may learn to draw on powers and strengths within themselves undreamt of in the teaching of current medical practice. For knowledge that is based on certainty, gives power, provides strength.

The leaders of modern thought, faced by the challenge of the new paradigm, will be driven to explore new aspects of knowledge, to found new and unguessed-at sciences. Those who are concerned with preserving and transforming the ancient traditions of wisdom will ask themselves 'Why and for what purpose has the new paradigm appeared now?' and they, in common with the vast majority of people, will find themselves led to a new understanding of the relationship of their individual selves to the great self of this guiding intelligence 'in whom we live, and move, and have our being'.

W.A.

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