

Look for Truth No Matter Where It Takes You

F. David Peat on David Bohm, Krishnamurti and Himself
by Simeon Alev

Introduction

While the lives of every scientist featured in this issue were touched in some way by the great spiritual teacher J. Krishnamurti, no scientist enjoyed a more intimate and enduring association with him than the late David Bohm.

Bohm and Krishnamurti first met in 1961 and their friendship, although it suffered a major crisis in 1984, ultimately lasted until Krishnamurti's death two years later.

Bohm began his scientific career as a protégé of J. Robert Oppenheimer, who headed the coordinated scientific effort known as the Manhattan Project to develop atomic weapons during World War II. By the time of his first encounter with Krishnamurti, Bohm had already gained an illustrious if somewhat controversial reputation as one of the most brilliant theoretical physicists of our era. He had developed the theory of the plasma—the fourth known state of matter, after the solid, liquid and gaseous states—and his analysis of the plasmatic behavior of electrons in metals had laid the foundation for much of solid-state physics. Bohm was also a central and outspoken participant in the ongoing debate which to this day surrounds quantum theory, and the creator of several provocative quantum "interpretations." While teaching at Princeton he had befriended Albert Einstein, who having spent years searching unsuccessfully for his own alternative to the generally accepted version of quantum mechanics, reportedly referred to Bohm as his "intellectual successor" and proclaimed, "If anyone can do it, then it will be Bohm."

But David Bohm is perhaps best known, especially among nonscientists, for a theory which was as much the expression of a lifelong spiritual quest as it was the fruit of profound scientific insight. This was his theory of the *implicate order*, founded on a vision of wholeness, or totality, in which matter and consciousness are united. Bohm appears to have been obsessed, even as a child, with the notion that we live in a universe in which matter and meaning are inseparable, and his use of the word "totality" to describe aspects of his scientific work during his first private meeting with Krishnamurti reportedly inspired Krishnamurti to jump out of his chair and embrace him.

When I read Bohm's *Wholeness and the Implicate Order* I often had similar feelings. The breadth and integrity of his vision is powerfully reflected in his reasoning, which is at once lucid, spacious, precise and deeply, mysteriously moving. Reading Bohm, one is stunned time and again by his ability to connect orders of phenomena which are staggeringly diverse, and by his passion for revealing the interrelatedness and dynamic cohesion of a world

customarily viewed as a form of mechanized chaos in which humans are destined to play little part. Wrenched away from a vantage point of isolation and separateness, one discovers oneself to be deeply implicated in an indivisible universe which is at once palpably real and eternally mysterious, a single multidimensional event without beginning or end.

To many of Bohm's colleagues, however, his insistence that the universe is *both* inherently orderly and impossible to fully understand was irritating rather than inspiring. Recalling a personally frustrating interview with Bohm in his recent book *The End of Science: Facing the Limits of Knowledge in the Twilight of the Scientific Age*, science writer John Horgan remarks that "Bohm was desperate to know, to discover the secret of everything, whether through physics or . . . through mystical knowledge. And yet he insisted that reality was unknowable—because, I believe he was repelled by the thought of finality." Horgan's premise, not uncommon these days, is that within twenty years science will have answered every important question known to man. But what Bohm manages to communicate quite clearly in their interaction is his view that final answers are not as important as an approach to understanding the world we live in which is not dependent on fixed ideas or conclusions. It was characteristic of Bohm to insist that the fixed ideas which underlie scientific hypotheses are not aids but obstructions to clarity, and that a methodology which combines discipline with openness would be better equipped to keep pace with the truth that is revealed as scientific investigation progresses and deepens.

But flexibility without rigor, so common in spiritual life, Bohm found equally inadequate. In an interview in the journal *ReVision* in 1981, he said: "Insofar as the mystic chooses to talk about his experience . . . he has to follow the rules governing the domain of the ordinary, that is, he has to be reasonable, logical and clear." And in this respect Bohm demanded no more of mystics than he did of contemporary quantum physicists, many of whom, in light of the paradoxical findings about the subatomic domain, have either dispensed with the need for concrete explanations or developed theories and even cosmologies more mystifying than the most esoteric visions of religious or spiritual figures. Ironically, it was Bohm's demand for purely physical explanations of quantum phenomena which in this case caused many of his colleagues to shun him.

Yet among those scientists who did appreciate his call, Bohm generally inspired great loyalty. One such scientist is the author and physicist F. David Peat, who as a young man listened with rapt attention to Bohm's explanations of quantum mechanics on BBC radio little knowing that several years later he would meet his hero seemingly by chance, that they would then become close friends and colleagues, that they would write a book together (*Science, Order and Creativity*), and that he himself would ultimately write Bohm's biography, *Infinite Potential: The Life and Times of David Bohm*, which was published this past November.

The author of several books, Peat is a man of wide-ranging interests whose explorations of modern physics, visual art, Jungian psychology and Native

American spirituality have taken him all over the world. Our interview was conducted by telephone from Pari, the Italian village near Siena where he currently lives. It was a pleasure to be able to speak about David Bohm with someone who knew him so intimately and whose recollections of him were so fresh in his mind. As our conversation makes clear, Peat's outlook on life reflects Bohm's influence in many important respects.

Infinite Potential is a full and candid portrait. While much of Bohm's work is breathtakingly beautiful and inspiring, and clearly the product of unstinting integrity, Peat is also clear-eyed and honest about his friend's shortcomings. "Bohm lived for the transcendental," he writes, "his dreams were of the light that penetrates. . . . Yet his life was accompanied by great personal pain and periods of crippling depression. He never achieved wholeness in his own personal life and the fruits of that life, which are still with us, were gained only at great sacrifice."

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Interview

WIE: *Why did you feel it was important, at this time, to write a biography of David Bohm?*

David Peat: I think it's a useful book in that it helps to put Dave's life in perspective and to bring all his work together, which has never really been done before. Dave had mentioned wanting to have an autobiography written—you know, trying to do it himself, or with help—and after his death in 1992, I talked it over with those who were closest to him. We all felt a concern that other people might jump in too quickly and decided that maybe we should just get one out now.

You see, it does *look* as if there are many different strands to Dave's work—the early work on plasmas, his theory of hidden variables, the implicate order and his explorations of new orders in physics; also his work with Krishnamurti, and on consciousness and soma-significance. But when you see his life as a whole, you realize that these are all aspects of a single way of looking at the universe, so they are really not different strands at all. I thought it would be helpful to people to see that, particularly some of the people in physics who are starting to take off with some of Dave's ideas, choosing some and not others. I thought it might be helpful to put them all there together so that people could see the extent to which all of his ideas were integrated—which even people who knew him fairly well didn't necessarily realize.

WIE: *His life and work were a coherent whole.*

DP: Yes, it seems to me that everything did all tie together and you can't just separate out part of it.

WIE: *Is there then an overall message that Bohm's life and work seems to hold for humanity?*

DP: Well, in some sense it *is* this vision of wholeness—which of course is not new; it's been present in many other philosophies and said before. But I think that each time someone says it, they are renewing it or reinventing it; they are bringing it to their time. And I think that David very much did that for our time. He also stressed the fact that science had fragmented, both within itself, and from spiritual matters and considerations of consciousness and the self. And you can see in the biography that these ideas were expressed through his own struggle. His life was both a personal struggle and a vision, a vision of something transcendent and a personal struggle to reach this condition of wholeness. And now his work, more and more, does seem relevant.

WIE: *How do you see spirituality and science coming together in his work?*

DP: Well, it's certainly true that in his early days he was suspicious of the organized religions, particularly during his Marxist period—and even afterwards—feeling that they weren't really serving the human race in a very good way. But at the same time there was always present a sense of the numinous, of the transcendent—from his early fantasies as a boy of going off into space and his visions of light, of illumination—the sense of an intensity in the mind, as if the mind could reach some truth that is always lying beyond the edge, that beyond some sort of frontier there's some deeper truth to be perceived. So I think his work was a spiritual search in *that* sense, something closer maybe to a mystical search for illumination, for light, for truth. He would often say that you must look for truth, no matter where it takes you; no matter how it looks, you must always face the truth. And in this context I think I should also mention the feeling he had, when he was doing physics, that the universe was inside his body—that he often did feel like a microcosm of the macrocosm. He felt that he could reach truth within his own body, that one could look both outside and inside. So throughout his life there was that sense of direct connection to the cosmos.

WIE: *He also seems to have had a sense that larger groups of people could experience life together in that way.*

DP: Yes, he used to speak about the different dimensions of the human being—the individual, the cosmic and the social—and particularly towards the end of his life he felt that these three should be integrated, and that then maybe some sort of collective consciousness could emerge. He would sometimes talk about the idea of a river that is polluted. You can try to clean up the pollution around the city, locally, but the important thing is to find the source of the pollution, and in the process of doing that you may discover some sort of new order. He felt that part of that pollution was

present in language and that we had to get to the root of that, the origin of it, which could only be done in the context of a group, through some sort of a dialogue.

Bohm and Krishnamurti

WIE: *In spite of the fact that Bohm was deeply interested in collaborating with other people, several of his collaborations seem to have ended in some kind of misunderstanding. His association with Krishnamurti is a case in point. How would you describe Krishnamurti's role in Bohm's life? Was that one of his most important relationships?*

DP: I think David Bohm would have felt that. Certainly he did say that the two most important encounters in his life were with Einstein and Krishnamurti. He felt something similar between the two men—the great, enormous energy that both of them had, and the intensity, and the honesty. And with each of them he had a deep friendship, but at an impersonal rather than a personal level. I think both men were quite important to him, but certainly with Krishnamurti the dialogues they had went very, very deep.

On the other hand, I have met people who felt that Bohm's thinking was *not* profoundly changed by Krishnamurti, that his ideas and ways of working were always of the same order, that being with Krishnamurti merely brought him encouragement and inspiration, and helped him through a very dark period when he was becoming disillusioned about the value of doing science in general. These people seem to feel that Krishnamurti was important to Dave at the time, but that his dialogue groups and all of that, and his later ideas about collective consciousness, didn't come from Krishnamurti.

This is a very difficult issue and maybe only time will tell, when we see things in perspective. Because as well as talking about David Bohm, many people are talking now about Krishnamurti too, within the Krishnamurti Foundation and also outside. They're reevaluating Krishnamurti, asking who he was and what was the significance of his life. People are beginning to face Krishnamurti and to ask questions about him. So it has been difficult for me to get clear answers from people about Krishnamurti and Bohm.

WIE: *Did you ever meet Krishnamurti yourself?*

DP: Yes. Dave organized two conferences of scientists to meet with Krishnamurti and I went to both of those.

WIE: *In the biography you go into some detail about their relationship as a whole, including its conclusion. Could you give a summary of how and why their relationship broke down?*

DP: In the biography I just had to go on what people told me, but I had also talked to Dave quite a bit about that. I think that they were building up a great intensity. When those two sat honestly together, openly together,

there was a deep intensity between them and Dave did indicate to me that he saw some of the things that Krishnamurti was talking about—some of them directly, and not secondhand.

On the other hand, he did get disturbed by the way that Krishnamurti's image was being fostered by the people around him. Although Krishnamurti said, "Truth is a pathless land. Don't listen to gurus, including the present speaker," people did treat him as a guru and did behave as if he were a guru. And I think that disturbed Dave. He felt there was some sort of incompatibility in this, something paradoxical. He began to wonder about the extent to which Krishnamurti may have been conditioned by his own upbringing and he would ask questions about that.

I think there were also some doubts in his mind about the way the Krishnamurti schools were operating because there seemed to be a lot of conflicts developing in the schools. If people were supposed to be working without all this conditioning, why then were there so many problems? So he had many questions, and I think that on at least one occasion he was in that frame of mind when he met with Krishnamurti. At the same time, I think he had questions about his own life and his own work, and was maybe moving towards one of his bouts with depression.

Krishnamurti, for his part, began to question why David Bohm, if he had seen so deeply the things Krishnamurti spoke about, was so dependent on other people; he seemed to be very dependent on his wife, and on Krishnamurti himself. So it really was a confrontation, in which Krishnamurti asked David to look at the whole nature of himself, and Dave had questions of his own about Krishnamurti. At the end there seemed to be a breakdown between them which was, I think, painful for Dave because he didn't fully understand what had happened or why, and although they did continue to meet, they never again explored things together at the depth they had in the past.

WIE: *Do you think that their meetings up to that point had been mostly intellectual, or was there a kind of spiritual depth between them such as one might encounter between a guru and a disciple?*

DP: I have talked to many people who were present at the meetings whose words I treat with great respect. And some of them wouldn't have used that image of the guru and the disciple by any means. They would rather use the image of two people exploring together, at a similar level, Dave having very deep insights from physics and a very keen intellect, and Krishnamurti coming from his angle, the two men exploring together, looking together at the same thing. In many cases David Bohm would be helping Krishnamurti to clarify, not so much Krishnamurti's perceptions—he couldn't do *that*—but the way Krishnamurti presented them, the language he used and the course of the discussion. Sometimes there were generalizations Krishnamurti would make that Dave would pounce upon and get him to refine.

But it was not only a meeting of two highly energetic minds; there did seem

to be, from Dave's point of view at least, a great deal of warmth and love in it too. That he did feel from Krishnamurti, the warmth. So it didn't seem to be the traditional guru/student relationship, more the relationship between two friends and colleagues. Dave said he also felt like that when he talked with Einstein, that the two of them were exploring together and there was no sense of one being superior to the other. And I think many people who worked with Dave felt that too. You were aware of course that Dave was far smarter than you were—he could run rings around you—but when you worked with him you didn't get the sense that Dave was the boss, but that you were exploring together. I think he had a similar kind of relationship with Krishnamurti.

At the same time, some people did feel that when the two of them were together there was some spiritual presence; in fact, people often said that there was an awareness of something powerful in the room. And certainly those public dialogues were very helpful to a lot of Westerners who felt that listening to them was a way to come to Krishnamurti because David Bohm was engaging them in a more Western way than Krishnamurti.

WIE: I brought up the guru/disciple aspect of their relationship because of a particular passage in the biography in which you describe the pressure to change which Krishnamurti began to exert on Bohm after they'd been together for about fifteen years—which would normally be considered appropriate, in that context, to his role as a spiritual teacher. But since you also suggest that Bohm had reservations about what he saw happening around Krishnamurti, maybe it really was more a matter of mutual recrimination.

DP: Again, it's difficult to know. I have talked to people who were in Krishnamurti's inner circle and they tell me that this type of a break happened many, many times. It is as if people sat with Krishnamurti for many years, until at some point he appeared almost to turn on them, or challenge them. Even people who Krishnamurti felt comfortable with and who he would allow close to him, he at some point felt the need to challenge. In that sense, when he challenged Dave about himself and his conditioning, that probably was very like the guru/student relationship; it had suddenly switched.

WIE: Which may have been rather startling to David Bohm.

DP: From what I gather, yes. But these are difficult things to know about definitively because the people around them all had such strong vested interests. There were some people who felt that Dave was very important to Krishnamurti, and others who would have been happier had Dave not been associated with him. These people felt that he was contaminating Krishnamurti's image, in a sense, that he was pushing Krishnamurti too strongly to speak in a Western, intellectual, rational way, thus losing the poetry. There were some people who felt that—that the poetry was being lost. But then, maybe they didn't see the poetry inherent in David Bohm.

Bohm's Science

WIE: *What were some of the core ideas in Bohm's worldview that made him such an important figure in the movement to unite science and spirituality?*

DP: Dave felt that science didn't have to be separate from everyday life, something abstract or having only to do with mechanisms. Rather, he felt that the universe itself was in a sense a mirror of our basic structure as human beings and of our relationship to the transcendent. That was the key that was present in all his thinking. So that when he began to develop his theory of the implicate order, there was a sense that this wasn't just about the structure of matter but also about the structure of consciousness, because everything mirrors itself. Even his earliest work, on plasmas, came about not so much through thinking about atoms and electrons—which of course he did—but about the basic dilemma of the individual and the collective: Can an individual simultaneously have freedom in a society and contribute to that society? He saw that here too, the basic dilemmas of human beings with regard to free will and obligations to society are somehow mirrored in the very structure of the universe. In fact there was a vision he had, I think when he was living in Brazil, in which he saw the universe as a collection of silver balls, each ball reflecting every other ball, itself included—a sort of infinite reflectivity of the universe in which each part is contained in everything else.

WIE: *Beginning with his work on plasmas, it seems that as time went on his thought acquired an increasingly cosmic dimension.*

DP: Yes, although you could say it had always been that way. Even while he was still in school he was trying to develop a theory about the cosmos based on the idea that it had to include consciousness as well, so right from the beginning he felt that any theory about the universe had to include the human being in it; the human observer had to be part of the theory. It couldn't be an objective theory in the conventional sense—something standing outside of phenomena that doesn't also take account of us, the existential fact of our being. His thought was always cosmic, always all-embracing.

WIE: *Why did so many scientists—why do so many scientists even now—seem to have so much trouble accepting or respecting his ideas?*

DP: Well, I suppose in some cases it's because people like small little bits of work—"resultlets," as David called them, not results but "resultlets." When Dave did his work he really dealt with ideas, with concepts, and in very broad brush strokes; whereas the fashion in physics today is that it should all be hyper-mathematical, and he always mistrusted mathematics. Mathematics to him was a good tool, but it was a tool and no more. The thing with mathematics, even the most beautiful and elegant mathematics, is that somewhere in there a lot of assumptions have been hidden, and when we speak together, using ordinary language, it's a little bit easier to

discover what those assumptions are. Mathematics tends to conceal a lot. He was also suspicious of other aspects of the way physics was being done—for example, all this reliance in particle physics on breaking things apart rather than seeing them in an all-embracing fashion. You see, Dave felt there had been a major revolution in this century in quantum mechanics and relativity, but that our thinking hadn't really caught up with it. In the old order you could fragment things, you could define everything on a Cartesian grid of space and time. Now we needed an entirely new order, and the implicate order, which is inherently infinite, was one of the approaches he was working on. But of course, that's asking too much of physicists. They like to see things small and finite, and Dave was too much of a global thinker, I think, for many of them—except the very good ones, who were sympathetic to Dave because they realized that something new was called for.

WIE: *But to most of the fraternity of physicists it seemed that he had gone beyond the bounds of science?*

DP: Yes. And it is ironic that now, after his death, his hidden variable work—which is the work that caused so much controversy—is now being picked up on by physicists because they see it as a way of making calculations. To Dave it was a completely new way of looking at quantum mechanics, but they are just using it as a way of making calculations. They have left the meat behind and just taken the juice.

WIE: *"Bohmian mechanics," they're calling it?*

DP: Yes, the Bohmian mechanics, that's right. That would have shocked Dave somewhat. It's ironic that that's what they have extracted from his theory. But similar things have happened in the past. He and Basil Hiley realized at one point that the new order they were looking for had already been anticipated by mathematicians like Grassman, Hamilton and Clifford. And in that case too, what had happened was that people had left the real deep stuff behind and just extracted some of the facile ways of doing calculations; the truly deep ideas had always been ignored.

WIE: *It might help people to put all of this information in context if you could give a concise overview of some of Bohm's most important theories.*

DP: Well, one was his theory of hidden variables, which I've just mentioned. He believed that the universe was an infinity of levels, that the universe could never be completely encompassed by human thought. In that respect he differed a great deal from Einstein and there was quite a bit of correspondence between them on this subject. Einstein felt that ultimately there would be a single, unified level that would explain everything, whereas Bohm believed that for each level we'd reach there would be another concealed beneath it, and so we'd never reach the end of it.

This idea also contained an alternative to reductionism because in reductionism you'd discover, say, molecules, and then you'd explain them in

terms of atoms, and atoms in terms of elementary particles, and so on; you'd go into smaller and smaller bricks. But for Bohm, the level above and the level below could mutually condition each other. So these were not really independent levels, much as you could say that the human body is made out of organs and cells, but that the cells in turn are determined by the whole order of the body. So the higher conditions the lower, and the lower the higher. He therefore felt that quantum mechanics, which is based on the idea of randomness and indeterminacy at the subatomic level, was just one step on the way to a deeper theory which would include these hidden variables. Like Einstein, Bohm wanted to retain the idea that there was a degree of objectivity at the subatomic level, that things *don't* have to have human observers around to make them happen; and he was also concerned that quantum mechanics doesn't offer any real explanation of how quantum events actually take place. So he developed a theory that he called first the "causal" and then the "ontological" interpretation of these events. These were essentially a way of trying to explain things in a more rational way, and although they didn't meet with much success in the 1950s, more recently people have come to accept them as another way of looking at quantum mechanics, another approach.

Then there was his theory of the implicate order. The world we seem to live in—the world of classical objects, the world of Newtonian physics—Dave referred to as the "explicate order." He felt that what we take for reality is only one particular level or perception of order. And underneath that is what he called the "implicate order," the enfolded order, in which things are folded together and deeply interconnected, and out of which the explicate order unfolds. The explicate is only, you could say, the froth on top of the milk and the implicate order is much deeper. It includes not only matter, but consciousness; it's only in the explicate order that we tend to break them apart, to see them as two separate things. Dave spent a great deal of time in the last decades of his life trying to find a mathematical expression for this vision of reality.

He also felt there was a need to reintroduce *time* into physics. Of course time had always been there as a parameter, but not as an actual dynamic entity which makes things move around. That was the work he was doing up to the very end of his life. And his other work of that period, with dialogue groups, was not separate from that because again, he felt that his theory had to include consciousness as well as matter, which led in this case to the idea that there could be a field of information. His ontological interpretation of the quantum theory gives the notion that matter is always responding to such a field. Up to that point we had two levels in nature—matter and energy. And now Bohm in his ontological interpretation introduced a third, which he called "active information"—information as an activity in nature. The electron moves and does these curious things because it is responding to a field of information, an active field. And the human body also responds to an active field—that's how the immune system works. So he introduced this notion of active information as something which is inherent in both matter and consciousness, a collective and non-local phenomenon to which the individual human consciousness, or brain, is

capable of responding. He believed it was possible to develop some sort of collectivity if people worked at it together over a period of time, so he developed his dialogue groups based on the idea that it might somehow be possible, through this active information, to produce a transformation in human consciousness. He may have believed that this is what had happened with Krishnamurti—that if you were with Krishnamurti, in the presence of Krishnamurti in a group of people, some change of consciousness took place.

WIE: *This was what he was trying to accomplish by himself, after the break with Krishnamurti.*

DP: Yes, that's right, by working with these groups. Sometimes he felt very encouraged by them and at other times he didn't. But he did believe it was possible—because in physics you don't always need an enormous amount of energy to effect a large change—that maybe even a few of these small groups could affect human consciousness.

The Unknown

WIE: *That could be seen as a rather ambitious goal, but one of the things that struck me about Bohm almost as soon as I began reading him is that in spite of his stature he seems to have been extremely humble. He seems to have had profound respect for what he didn't know.*

DP: Yes, that was certainly true. Although there was of course the other side too. He would argue quite forcefully with people; when people were on the wrong lines he wouldn't let them off the hook. But yes, he had a sense that, before the whole universe, we know very little.

WIE: *Do you feel that this humility played a role in his work?*

DP: It certainly made it easy for the people that wanted to work with him. You just sat down and looked at the problem or discussed things. And in the same way it probably allowed him to sit and talk with Krishnamurti without that big sense of self being there. Most of the people that met Krishnamurti were aware that they were in the presence of a guru, which made it somehow difficult for them to speak to him. And his humility probably made it easy for him to speak to Einstein too.

WIE: *And in his thought? Do you think this humility played a role in his ability to draw the conclusions that he did or to have the perspective that he had?*

DP: You know, there's always an easy way out, isn't there? You could take your ideas and say, "I'll present them in a way that the public will find pleasing," or, "I won't take them too far." You can search for approval or for promotion—all of those things which lead inevitably to compromise. If you want to be successful you might find some little field and try to carve it out. But right from the beginning Dave never wanted to do that. He had the honesty and the modesty to do what he really wanted to do, which was to

ask the biggest questions. I mean, what makes it possible to ask the biggest questions? You are either very arrogant or you freely admit that you don't know very much.

WIE: *What impact did your association with him have on you, as a human being, and also as a scientist?*

DP: Well, probably it helped me to give up doing science! It came at a very good time, a time when I was questioning a lot of things myself and wanting really to go to an edge in what I was doing. I came to work with Roger Penrose in London for a sabbatical year, met David Bohm almost by chance, and started talking to him. Actually, what happened may be similar to what happened between Bohm and Krishnamurti: it wasn't that Dave revealed anything new to me, but he confirmed the suspicions that I already had. I probably had wanted to look at all these deeper questions, but didn't have the guts to do it, or didn't think it was practical or even possible. But when I saw that Bohm was doing it, I thought, "Well, why not the rest of us?" Maybe Krishnamurti didn't really tell David Bohm anything new. Maybe he just supported him in his inquiries. In my case, the crucial thing was to feel that support from Dave over a number of years. It's not that he thought he was actively supporting me; just his presence was supportive.

He also made a point of rejecting this idea of geniuses, of saying that you don't have to be a genius. Anybody can do it who has the energy to question and to face things, to keep working on something. That's an important point to make. Otherwise a lot of people will give up and say, "Well, I'm not a genius." This is what was said to me when I was doing research, "Well, you're not a genius, so why bother doing *those* things? Pick something small." Whereas Dave made the point that *anybody* can do this work. You have to have some training of course, but the main thing is to keep asking those questions. Anybody can ask those questions.

WIE: *This advice you were given about not being a genius—is it routine for graduate students in physics to hear that kind of thing?*

DP: Yes. Yes it is. It happens quite a lot. Another piece of advice I was given was, "Find a very, very small area in physics and then just publish about ten or fifteen papers on it; then you'll get a reputation. *Then* you can go and do this other stuff." In fact—another little story—when I did go and spend a sabbatical with Bohm, a very senior physicist in England asked me to come visit him for a few days. He took me out to dinner one night and, very fatherly, said he wanted to give me some advice. He said he knew I was working with Bohm and that it probably wasn't a very good thing to be doing. It would be bad for me, and really I should try to dissociate myself from him and go back to doing small pieces of physics. "Do small problems," he said. "That's the way that physics is going to progress, by people doing little bits of things."

Another person told me that his ambition was to be just a footnote in a

textbook. Now Dave never thought that way. Dave felt that was a deeply false modesty, when people said that sort of thing, and that really the only important thing was to ask the big questions—otherwise, why do physics? I think this idea was expressed in one of the letters between Dave and Einstein. Einstein wrote, "If this is the way things are going, then there's no point in my doing physics anymore."

WIE: *What are some of the directions your work has taken which you might not have pursued had you not met David Bohm?*

DP: Well, it was more a matter of opening up the inquiry. David Bohm once told me that the most significant thing Krishnamurti had told him was, "Begin with the unknown." Now Krishnamurti didn't have much time for Dave doing physics—I don't think he thought much of it—but that was his advice: "Begin with the unknown." It's out of that, I suppose, that I've spent time talking with Native Americans, trying to understand their world. And over the last few years, I've also talked a lot with visual artists—sculptors, painters—trying to understand the struggle that they are engaged in, which also has to do with looking for a new order, and I've seen incredible similarities between that and what people are looking at in physics. Mainly I'm just trying to ask the biggest possible questions. Maybe that's what Dave left me with.

WIE: *When Krishnamurti said, "Begin with the unknown," you must have a sense of what he meant by that.*

DP: I think Krishnamurti felt that proceeding from the known to the unknown is not the way to work. You must begin with the unknown, with the question, and in the unknown one finds this enormous energy, whereas when you are constantly working from the known, there isn't that energy to penetrate things. David himself told someone else one time, "Between where you are now and where you'd like to be there's a sort of barrier, or a chasm, and sometimes it's a good idea to imagine that you're already at the other side of that chasm, so that you can start on the unknown side."

New Directions for Science

WIE: *I read an article of yours in which you outlined the need for a completely new paradigm for Western science, and described your own explorations of the worldviews and cosmologies of Native American cultures. How are you able to reconcile these directions which, in the minds of many people, may seem quite far apart?*

DP: Well, I suppose that when I did sit down with some Native American elders and tried to understand their worldview—not that I *did* understand it beyond the merest occasional glimpses—some of the things they said did seem to correspond. . . . But you see, I didn't ever want to do or write anything that was like *The Tao of Physics* because I don't know if I believe all that stuff.

What you *could* say, though, is that there is a certain perception of the cosmos, or a perception of our relationship to it, which is present among the Native Americans, and it's a process vision of nature: everything is process, it's flux, it's transformation. We come into relationship with this flux, but the basic reality itself is transformation and change. On the other hand, for several hundred years, physics looked for certain kinds of fixed orders and structures until finally quantum mechanics subverted that program. And then later on, chaos theory also subverted that program.

So you could say that Western physics reflected a human desire for a certain kind of order—a classical order or a Platonic order—which has now been subverted. It's as if nature has told us that we can't go that way anymore and that the way ahead, quantum theory or whatever, corresponds in some ways to the perceptions that I've had when talking to Native Americans. You can see that these two ways of looking at things are not that far apart. The Native Americans see a universe which is a flux, or a process, or a relationship of energies. And when you ask quantum physicists, "What are these things, what are molecules?" they will tell you, "Well, they are relationships of energies." For example, David Bohm's idea of an elementary particle was of a process: a particle is constantly in the process of collapsing inward and expanding outward. So we too are now dealing, really, with fluxes and processes and relationships, which is very similar to the metaphysics of Native Americans. I was very struck by that. I suppose I was also struck by the fact that they had developed a language which enabled them to live in that sort of a world. One of the key problems with quantum mechanics, as Niels Bohr pointed out, is that the Indo-European languages, which we use, deal with concepts and interactions between static objects, and because of that they just cannot seem to deal with the quantum world. We seem to be cut off from it by virtue of our language.

WIE: *We don't have a language adequate to express those truths.*

DP: Right, because our language works in terms of nouns, so what we tend to see is a world of objects and interactions. And because we have a noun-based language we also tend to see categories and concepts, and to put things in categories. So a certain way of thinking, a certain logic, follows from the languages that we speak. But some Native American groups don't have those sorts of languages, as a result of which they don't have the idea of categories to put things in, and they don't come up with the sorts of problems that we do. There's a kind of liberation in that, you see: by looking at their world and coming back to mine I see my experience of the world as culturally conditioned rather than inevitable; I see that there could be other ways of looking at it. That's what I found so valuable about that contact. So to answer your question, I didn't see any incompatibility between my interest in science and my interest in Native Americans. I'm talking a lot with artists these days for similar reasons: because I can see that the other big change that needs to come about in physics is a change in our concept of space, and all of the artists I'm talking to are very concerned with that. It could be that as we approach the millennium we are all beginning, through

our different disciplines, to look at similar sorts of questions; or that the rigidity of the Western mind has come to an end and is giving way to something more flexible. Maybe science is being tempered by things like intuition, by compassion, by other sets of values that have not been present before.

WIE: *From a certain point of view science has always been innovative, but at the same time scientists have traditionally taken great pride in the rigor and rationality of their methodology. These days however, several people who are considered cutting edge members of the current generation of scientists are pursuing very fascinating but, from a certain point of view, seemingly outrageous directions. Rupert Sheldrake, for example, who also appears in this issue, is investigating "the physics of angels."*

DP: Oh, really, is he? So he's come out with it, then.

WIE: *Yes, he's just published a book about it. And it occurred to me that people could conceivably think of this as a leap beyond the kind of rigor that scientific investigation requires.*

DP: I'm sure many people would.

But you see, I'm living in this village in Italy where I pay very small rent and the wine is very cheap and all the food the people grow locally. I don't really have to satisfy anybody anymore so it doesn't really matter too much to me. And when I talk to Native Americans I can see that these people have incredible discipline in their life and in the way they work—much more discipline than we have in ours I would say—and also for the artists I've talked to, there's a long, deeply honest engagement with their materials and with their work and I see tremendous rigor in that. I'm interested in rigor in *that* sense. Maybe we should go back to David Bohm's idea of looking for the truth wherever it takes you and not compromising, not trying to sweeten things. The people who do that are the people I respect.

Now you do know of course that there are all sorts of kooky, crazy people too, both within and outside the scientific community, but I'm not so much interested in that.

WIE: *So in this case for example, one could conceive of the physics of angels as a very creative, very risky direction in which Sheldrake is going out on a limb in order to explore something that he deeply believes in.*

DP: You're asking me to comment on something I don't know too much about. But maybe I could put it this way—and I hope I'm not being mealy-mouthed: If, eight hundred years ago, some of the deepest philosophical minds in Europe such as Dionysius the Carthusian and St. Thomas Aquinas debated and looked very deeply at certain sorts of issues regarding the way they perceived reality and came to conclusions about it, then I think that is worth taking seriously. Now when you try to import that into quantum mechanics, for example, it usually *does* become totally flaky and stupid and

new age. So the thing is, you have to perform a very creative act of discovering the language with which to express these things in a way that is honest to the modern world and honest to the original ideas. I think that's where the real difficulty lies: it's an act of translation. Because after all, who was it?—I think it was Nicholas of Cusa—who developed an idea very similar to the implicate order, but you couldn't have imported Nicholas of Cusa into quantum mechanics. It just wouldn't have worked. It needed someone like David Bohm to rediscover the idea, put it in a new context and a different language. So I think that's partly what it is. And if Rupert Sheldrake is able to bring intellectual respect to Aquinas and Dionysius and all those people within our modern contemporary world, then that is a creative thing to have done. I've not read his book and I've only talked to him briefly about this.

WIE: I think I agree, but I wasn't necessarily asking you to comment on Sheldrake specifically so much as on this kind of thing as an overall direction in contemporary science.

DP: Well, angels, okay. But flying saucers and alien abductions and things? . . . I've just come back from the Institute of Contemporary Arts conference in London last week where we had flying saucers, alien abductions, massive doses of drugs, Timothy Leary dying on the Internet—all of that stuff. Now *that's* getting a bit flaky.

WIE: So in making these kinds of distinctions, how do you draw the line?

DP: It's very difficult. A lot of it depends on the people involved. I think you can spot a kooky person pretty easily, and there are a lot of kooky people. But I suppose if you meet a person and you have a degree of respect for them, and then they tell you something that sounds a bit outlandish, you should spend a certain amount of time with them and go into it, talk about it, explore it. There's always a way, even if what you hear at first is a crazy language. I mean, when you hear that Swedenborg went to other planets and things like that, that obviously is kooky stuff; I personally don't believe that Swedenborg went to other planets. But if you gather that maybe Swedenborg had an intuition of some sort of truth about things and tried to express it in the only language he knew at the time, that becomes a bit more acceptable and then you can say, "Let's sit down with this fellow Swedenborg because he seems to be a very intelligent, deep thinker. Now what is he saying?" Maybe that's the only way you can do it, at a personal level. You may have to try, initially, not to be put off by the language in which the thing is expressed, whether it's flying saucers or angels or whatever, and ask yourself, "What if it's a metaphor for something, an image of something? Alright, then what is it an image about?"

Some people see flying saucers, other people see angels, but what is it really all about? Native Americans will say, "We see the guardians of the spirit." And you press them a little bit more: "What are the guardians of the spirit?" "Well, they are energies." Then you say, "Okay, if you're talking about energies, and I'm talking about energies, then we're talking the same

language, which is about relationships of energies." It's about trying to find some sort of common language and respecting each other in discussion.

WIE: *Then from your point of view, those are equally valid idioms or ways of describing the same thing?*

DP: What I mean to say is that when you're dealing with a culture that has developed and existed for a long time, such as the Native Americans, or even Europe in the Middle Ages that talked about angels, then you have to have a lot of respect for it. Now that's not the same as saying that you have respect for flying saucers or magical inner children or your higher animal or anything like that, as people do in California. I'm not saying *that*. I want to stay on one side of this.

WIE: *The distinction that's made by some of the people I've been reading—Ken Wilber and Huston Smith, for example—is not that these aren't all valid ways of investigating and describing our experience, but that there can be a kind of category error that takes place. The domain of science is that of an empirically verifiable physical reality, this argument goes, while the spiritual domain, and also the rational/philosophical domain, address completely different dimensions of human experience. All of these are related of course, but even so, one shouldn't expect to be able to say something in one domain that will apply in another.*

DP: Yes, those are strong arguments, I can see those.

You know, there's a story about Pasteur. Pasteur was in his laboratory and somebody came to interview him and said, "Pasteur, sir, doctor, when do you pray?" And he said, "I am praying now," as he was looking through his microscope. In the individual life, the life of David Bohm for example, there could have been no time when he stopped being a scientist and became something else. He could not have accomplished that fragmentation of his own being. It's the same with a Native elder; there's no time when a Native elder is not in a deep spiritual relationship with nature and there's no time when he's not praying; it's happening all the time. So personally I don't see how a human being could stop being one thing and suddenly become another. And I think that for some scientists the basic impulse is a religious one, or a spiritual one—a sense of the numinous, of some deep order or some transcendental quality of the universe. You will always find that to be true of these scientists, even after you've distinguished their honesty and their willingness to face the truth from their work and the particular language in which their ideas are expressed.

But I do take the point that there's a danger in using science to prove religion or to give credibility to religion—you know, a "God and the New Physics" type of book. I think there's a danger in that.

WIE: *You mentioned The Tao of Physics earlier. Do you feel that Fritjof Capra's work falls into that category?*

DP: To be honest, I've never read it. I must be one of the few people on the planet who's not got around to reading it yet, so I don't know, I couldn't say, it may, it may not. But I do think there are a lot of weak analogies, when you say for example that quantum mechanics produces a vacuum state, which is a state of infinite potential energy, and then you jump from there to saying, "Well, that's God." Now that's really stupid stuff. That's very silly.

WIE: *Picking up a thread we left behind, having more to do with your own perception of things: For you, what is the most important thing in life?*

DP: Hmm. . . . An easy question! The most important thing in life. . . . You know, maybe I don't think about it. Maybe I don't think about that sort of thing. I mean, it's been nice finding a village on a hilltop, surrounded by beauty, where people live in a sort of traditional way, where you can lead a life that's balanced—a little bit of walking, good food, warmth. And, I suppose, being able to express yourself creatively, maybe that's the important thing—whatever it might be, writing or painting or doing something. And having relationships with people. . . .

I don't know. I don't know. It's not something that worries me. Maybe if it worried me I wouldn't be doing this. In the past I was more worried about things. Maybe I'm not worried at the moment . . . but nothing lasts forever!