# Comparing Science and Buddhism

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Comparison of science and Eastern philosophy has become almost a literary sub-genre in itself. The idea that science has similarities to Eastern philosophy is frequently accepted as something already demonstrated. It is a part of our modern (or postmodern) culture. Most familiar in this context is Fritjof Capra's The Tao of Physics.<sup>1</sup> Many have read this book and many more have heard about its thesis that Eastern mysticism and modern quantum physics have similar teachings about the nature of reality. The soundness of this notion is not usually questioned. Clearly the book strikes a chord. Two very important cultural events of the twentieth century in the West have been new ideas about the nature of physical reality and the importation of the ideas of Eastern religion and philosophy; The Tao of Physics brings these together. Physics is associated in most of our minds with nuclear war, the greatest fear of our age. To be able to see modern physics as a way to spiritual truth rather than to world destruction is a great relief. A creation of the human mind that might destroy the world becomes part of a way to save it. Eastern philosophy is often seen as a source of ideas that can restore a sense of meaning. Unlike Christianity with its burdensome history of inquisition and internecine persecution, Eastern religions, especially Taoism and Buddhism, seem gentle and nonviolent. Indeed both might be part of a new form of consciousness which will result, at last, in peace and harmony. Fusion of the strange ideas of Eastern philosophy with the equally strange ones of quantum physics becomes a modern Zen paradox with great appeal. It is an idea which pleases almost everybody.

In this happy situation it may seem graceless to offer a critique of the idea that modern science has rediscovered ancient truths which will lift the spiritual level of the human race.

Nonetheless, I believe that this easy equation of science and Eastern religion or philosophy has many problems which are usually overlooked. To the extent that the proposed synthesis of science and Eastern thought is based on misunderstandings it will not contribute to better or more complete human consciousness. In the analysis that follows I try to show how efforts to present Eastern philosophy and modern science as analogous are misleading and obscure the nature of both. To take science or Eastern philosophy seriously is to want to see them with as much clarity as possible. Furthermore, critical analysis of a seminal idea always has the possibility of illuminating important cultural issues. It is hardly original to propose that American culture which is now world wide - takes up appealing ideas as answers to its concerns, displays them everywhere, then drops them for something else. In this process there is little chance to appreciate the ideas on a deeper level. Underlying this paper is the belief that what value Eastern philosophy has for the modern, Westernized world, is best served by trying to see it accurately rather than solely through the lens of popularization.

Because science, whatever its faults and limitations, is the dominant intellectual mode in our world, other systems of thought must establish some relationship to science. To understand a previously remote idea system, one must see how it resembles or does not resemble more familiar world views. Thus comparison of Eastern philosophy and science is inevitable and desirable but as an ongoing process with initial conclusions revised as each system improves our vision of the other. While the approach adopted here is a critical one, this is not meant to imply that making such comparisons is illegitimate - though some might argue thus - but rather that we need to scrutinize them carefully. Comparisons both illuminate and obscure and so must be employed in full recognition of both potentials. Too great an enthusiasm for similarities tends to encourage overlooking what is different and therefore potentially of greatest value. My reason for attempting to disentangle science and Buddhism is not to express a preference for one or the other but to permit both to be seen more clearly and to consider what sort of relationship they might have other than similarity or difference. To do so it is necessary to consider what relationship they do not have so as to let the actual relationship be seen more clearly.

14.

Before proceeding it must be pointed out that to speak of "Eastern philosophy" as a simple entity is itself problematic. For now I shall use the term without further analysis but will examine problems with its use later. While my emphasis will be on comparisons of science to Buddhism, it is also necessary to consider other Eastern philosophies or religions since Western comparisons usually do not make precise distinctions, or when they do, as with Joseph Needham, each Eastern religion is explained by comparison to others. At times I will be somewhat vague about which "Eastern philosophy" is being referred to because the writings I am discussing are themselves vague on this point.

There is considerable discussion of whether Buddhism (or Confucianism, or Taoism or Yoga) are to be considered philosophies or religions. Generally the implication is that philosophy is a purer and higher form of human thought than religion. I see limited usefulness in such a distinction when applied to Eastern thought systems. It is evident that Buddhism, Taoism, etc., are religions with philosophical elements as are Christianity, Judaism and Islam. For example, medieval philosophy devoted great intelligence to analysis of causality as did Buddhism. And followers of both invoke spiritual beings for help in personal difficulties, a practice that would not be considered to be philosophy. To separate the two is to introduce a modern distinction of questionable validity for the systems we are considering. When I refer to Eastern or Buddhist philosophy, I am referring to the philosophical aspects of these religions and not making a claim that they are more philosophical and less religious than Western religions. However, some of the writers whose works I shall consider do make such a claim. Mansel Davies whose work is discussed at greater length later states, "It is clear that Buddhism, in the Theravada school, is not a religion."2 To me this assertion is simply erroneous. Anyone visiting a temple in Thailand, hearing the chanting, observing the rituals such as placing gold leaf on Buddha images or noting that monks cannot eat past noon, would be hard put to understand such behaviors as philosophical rather than religious. It may be true, as it is for other religions that a philosophy can be extracted from it but in the process, much that is clearly Buddhism is left behind.

Currently the view that Eastern philosophy and science are compatible is in the ascendant, but it has not always been thus. This paper will give greatest attention to theories that Eastern philosophy is similar to modern science. However, it is important to point out at the beginning that there has been a substantial body of opinion in the other direction. These are infrequent now because condescension toward other cultures, especially those formerly colonized, is out of favor. Yet a view of Buddhism as unscientific was common fifty or more years ago. The disparaging approach may be enjoying a resurgence in the form of newly fashionable French paradigms as, for example, the work of Bernard Faure on Zen. Earlier attacks on Buddhism seem to have been motivated by a concern to protect Christianity against the discovery that other sophisticated religions were in existence and had been for more than two millennia. Christian disparagement of Buddhism is guite another subject and will not be taken up here. Of more interest, because seemingly related to a scientific attitude, is a critique of Buddhism as practiced which arises from a vision of religion as a repressive factor in human life. This view of religion began in the Enlightenment or earlier as a mode of attack on Christianity. Religion was seen as inhibiting human freedom and encouraging foolish and irrational thinking. Gibbon's work on Roman Christianity is often in this mode; for example, in discussing the asceticism of the desert fathers. The condescending tone of attacks on Christianity from within was at times applied to descriptions of Eastern religion as in the work of L. Austine Waddell which often seems like a satire on the excesses of nineteenth century ethnography. Waddell was one of the first Western scholars to actually visit Tibet and his books are fascinating and provocative. An admirer of the Buddha's teachings, Waddell described them as a "tolerant creed of universal benevolence quickened by the benign example of a pure and noble life, [which] appealed to the feelings of the people with irresistible force and directness."<sup>3</sup> Of later Buddhism, he had little good to say, particularly in respect to the complex meditative practices of such interest today. "And this yoga parasite, containing within itself the germs of Tantrism, seized strong hold of its host and soon developed its monster outgrowths, which crushed and cankered most of the little life of purely Buddhist stock yet left in the Mahāyāna."4 The mysticism of Tibetan Buddhism, "became a silly mummery of unmeaning jargon and 'magic circles.""5 Waddell's unsympathetic view is uncongenial today and with its romantic talk of "demonesses" and "ogresses" is readily stigmatized as "Orientalist discourse." My purpose in citing it, however, is simply to remind that it has not always seemed evident that Buddhism is scientific. Waddell's work exemplifies another way in which Buddhism has been presented - as irrational and remote from science. One starts to have an inkling that to describe Buddhism as scientific or as unscientific may each be an incomplete depiction based on selecting some aspects and ignoring others.

Waddell's views hardly need the effort of refutation now. However, one serious and sympathetic Asian scholar of great eminence, Joseph Needham, also considers Buddhism as antiscientific. Needham's more thoughtful ideas merit extended consideration because they show how a responsible scholar could view Buddhism as unscientific. As will be apparent, I believe his ideas are at least as flawed as those which find Buddhism to be a scientific religion. To approach the problem in a Buddhist way, Capra and Needham can be seen as representing extreme views with truth to be found in a middle way between them. This I attempt to do in more detail in the final section of the paper in which I investigate directly several ways in which Buddhist thought can be considered scientific. First, Buddhism might eschew non-scientific ways of establishing truth such as faith or authority. Second, Buddhism might be scientific in using the method of science empirical verification – in studying matters of religious concern. Such a claim has often been made. Third, Buddhism might be scientific in a looser sense of being particularly compatible with the cognitive style of the scientist. This approach looks for similarities in science and Buddhism less in content than in style. Buddhism might be particularly compatible with a scientific way of thinking without itself being scientific. This I shall propose is the least distorting way to bring Buddhism and science together.

Along the path to this way between extremes my approach may seem highly critical to some readers who have found works such as the Tao of Physics appealing or reassuring. If one regards Buddhism with complete seriousness, however, it is essential to have as accurate an understanding of it as possible in order for it to be a basis for spiritual development. Misrepresentations of Buddhism, however appealing at first, could mislead and hinder efforts toward enlightenment in this precious human existence which we know to be all too brief. One thinks of the two Zen poems about the mirror. It is easier to understand polishing the mirror so that it does not get dusty than the correct (in the history of Chan) version in which it can never gather dust. Understanding Buddhism is never simple, as Sākyamuni himself told Ananda, and it is well to be skeptical of presentations in which it is made to seem so. Finally, if what Buddhism teaches is contained anyway in modern physics, then the need for Buddhism in its religious form drops away. Science mysticism tends to see itself as replacing the original forms of mysticism and so, as we shall see in the discussion of Capra, this path may in fact lead away from Eastern religion .

# Definition of Science

It is necessary to define science in order to discuss its comparison to other ways of thinking. Here I use the standard definition of science as fields of inquiry in which truth is decided by empirical testing and in which a hypothesis must be falsifiable in principle in order to be considered meaningful. This is the standard definition as it might be taught to undergraduates and as described by A. J. Ayer in his famous book, *Language Truth and Logic.*<sup>6</sup> More recent analyses which conclude that science rests on non-verifiable axioms, for example the principle of verifiability itself, are of interest within the philosophy of science but be-

yond the scope of the present study. Sir Karl Popper has treated verifiability in a more sophisticated way and allowed a role for cultural factors in determining scientific knowledge. Thomas S. Kuhn's theories put revolutionary rhetoric into philosophy of science and have been very popular.<sup>7</sup> However Avers' definition still captures what science claims to be distinctive about itself. Practicing scientists, in my experience, are usually not particularly aware of or interested in these issues in contemporary philosophy of science. Scientists think of science in terms similar to those of A. J. Ayer, as a process in which verifiable hypotheses are tested by experiments. Speculations which cannot be verified are usually of little interest to researchers in contrast to the audience for science popularizations which seems to crave them. Accordingly, I have taken verifiability as the essential characteristic of scientific knowledge because my main object of attention here is science as a living practice, not as a metadiscourse on its own methods. It may be better to speak of falsifiability because in general, empirical hypotheses cannot usually be absolutely proven - another experiment might have a different result – but they can be refuted.

The term science is used in at least several other related ways. Most often it refers to the systematic body of knowledge acquired by the use of the scientific method; this, more than method, is what one learns when one studies science at an elementary level. Science thus refers to the bodies of knowledge of biology, medicine, astronomy, physics, archaeology, etc.

I will generally use "science" in the sense of the physical and biological ("hard") sciences and not in the sense of the term, "human sciences." This latter often refers to attempts at building grand theories which explain everything. Although hard science is sometimes presented as if its goal is to explain everything, the actual practice of science involves the manipulation and acquisition of fragments of knowledge. Most scientists are suspicious of speculative syntheses and tend to regard formulation of them as self-indulgence. Theorizing is the activity of only a tiny minority of scientists. While speculation appeals to popularizers. scientists do not see production of theories which cannot be immediately tested as of particular value. Often they feel the contrary, that theorizing tends to obscure rather than to reveal truth. The human sciences tend to proceed by introspection or personal observation and not by experiment. In what sense the "human sciences" are sciences is one which need not be taken up here; my point has simply been to point to a use of "science" which is different from that assumed in this essay.

An essential attribute of the hard sciences, though the one most often withheld in popular accounts, is that the processes by which truth is arrived at in science are quantitative. The fundamental activity of scientists is not theorizing, despite the popular image of scientists sitting thinking profound thoughts. In actuality, scientists spend their time making measurements. Rather than being a glamorous wrestling with ultimate questions, the activity of science consists of laborious manual operations which produce quantities which are then processed by mathematics. This is rapidly apparent to those who begin to study these subjects at college level. Many who are attracted to the ideas of science as they are presented in popularizations find themselves unable to understand them when presented mathematically. Biological sciences may seem non-mathematical but actually are not. The conclusion that a certain drug can cure a particular disease can be stated without mathematics but the research that developed it depends on quantitative measurements.

Now it is evident that Eastern religion or mysticism generally are not mathematical in the ways that science is. Quantitative measurements are not made and fundamental truths are not expressed in equations. When numbers are used they are prescriptive – proportions of an image, repetitions of a mantra – not the result of an observation. The fundamental number of Indian religion – 108 – is simply a given. In contrast the fundamental constants of science – pi, the Avogadro number, etc. – are found by observation. This point seems obvious enough but I think has been ignored. Doing physics or biology involves making quantitative observations, recording them and carrying out calculations on them. Doing meditation may involve observing the mind but not quantitatively. The mental operations are vastly different even if both involve careful observation.

# Buddhism and "Eastern Mysticism"

Although I have defined what I mean by science in the present paper, I avoided giving specific definitions of Buddhism or "Eastern mysticism" because concise definitions are not possible. This seems to me inherent in the subjects. Science is a large area of human concern but one defined by its agreement on certain methodological axioms. Religion or philosophy cannot be so simply described in terms which would be accepted by all who might be considered religious thinkers. In discussions of particular works I have considered the definitions implicit in them and how well they represent what is being discussed. Nor have I distinguished clearly between "Eastern mysticism," "Eastern philosophy" and "Eastern religion" because I believe such distinctions are often artificial. Accordingly I have used these terms depending on what has been used in the work under discussion and not always explicitly reiterating my skepticism about these formulations. I certainly do not imply by using these terms that I hold there is a simply located Eastern mysticism or philosophy or religion. Rather I have taken up the question of how Western writers have represented what they term "Eastern philosophy."

Although the primary focus of this paper is comparisons of science to Buddhism, some of the works which I will discuss, particularly Fritjof Capra's Tao of Physics, do not make clear distinctions between Buddhism and other forms of what Capra generically refers to as "Eastern mysticism." I have placed this term in quotes to indicate that it is the use of this phrase in the works under discussion to which I am referring. For scholars of Eastern religion, finding systems of thought as diverse as Hinduism. Buddhism. Taoism grouped together is likely to raise questions about the knowledge of the writer making such a conflation. However, popular accounts not only see these as containing similar ideas but also mix them in their writings without always having a clear idea of the source of the various ingredients in the mixture. In writings by those with direct religious inspiration, such as the works of Helena P. Blavatsky, sources are further obscured because ideas are presented as secretly revealed truth and stated sources are often incorrect.

"Eastern mysticism" does have an existence in writings of its various Western interpreters as well as some modern Eastern ones. It has similarities and differences with actual Asian religion and philosophy. While I discuss problems with the concept of "Eastern mysticism" briefly in the discussion of *The Tao of Physics*, I am not primarily concerned to study the sources of this discourse or the extent to which it accurately represents its claimed sources. I do consider whether Eastern thought is represented correctly in connection with its supposed similarity to science. When I am referring to the religions in question such as Hinduism, Buddhism or Taoism, I have used the terms Eastern or Oriental religion but without quotes. Here I am referring to the phenomena themselves, at least as I understand them, rather than to a particular writer's conception of them. I am not claiming a final understanding of these religions but I do claim that they can be more accurately represented than many of the authors under consideration have done.

# Science Mysticism

I have used the term "science mysticism" to refer to ideas which consider science to reveal or confirm the sort of truths usually considered the province of mysticism. Science mysticism includes "physics mysticism" which is, more narrowly, the idea that modern physics recapitulates ideas associated with religious mysticism. Science mysticism is widely held today though not necessarily critically examined by most who think that somehow quantum mechanics has confirmed mystical truths.

Proponents of science mysticism often present their ideas as being new or cutting edge. Some quotations from a book published in 1993 will be helpful in giving an historical perspective on science mysticism.

But we have outgrown (or, at least, are outgrowing) a scientific method which, in practice, excludes from the domain of knowledge all experience not derived through the avenue of sense, and a theology based on imperialism....<sup>8</sup>

It would almost seem as if the chasm between "exact science" and the "superstitions of the past" were about to be bridged over...<sup>9</sup>

Our young men, the most vigorous of our scientists, are beginning to see visions, and the visions of a Crookes, a Keely or a Tesla, it would be folly to despise.<sup>10</sup>

The book from which these are quoted was published in 1993 but is a reprint of a work first published in 1893. Harrison drew from Theosophy (which is a far more important source of contemporary science mysticism than is usually acknowledged), from English occultism, and from other mystical idea systems of his time.

What I wish to show in quoting Harrison's work is that the claim that science is moving toward demonstrating truths of a kind considered mystical was not new with the publication of The Tao of Physics in 1975 but is at least one hundred years old. The last quote - except for its sole reference to scientists as "young men" - could be contemporary. The names now might be Einstein, Heisenberg and Pauli but the sense is the same. An aspect to which I want to draw particular attention is expressed in the statement that the most vigorous scientists are "beginning to see visions." It is assumed that the coming together of science and mysticism is something that is beginning to happen but is not yet complete; the day will come, it seems to be suggesting, when we will at last see religion and science as mutually confirming each other. While it is hinted that this process has started, it remains in the future. The same hint is made by science mysticism today, one hundred years later. Quantum physics has started to move toward mysticism but the real breakthrough is to come, it is around the corner. Most are still unable to recognize it.

It is characteristic of mystical writing to suggest at truths not quite yet realized. The union of physics and metaphysics has been hinted at

but will become complete some time in the future when we see a little more fully, a little farther, than we do today. Research is now in progress which will do this, modern cosmology perhaps, which will complete our understanding. But it has not quite happened yet. Capra similarly presents his "new paradigm" as "emerging," almost but not quite here.

# Spiritual Evolution and Buddhism

Although it did not originate with them, Madame Blavatsky and the Theosophical Society she inspired were the most quantitatively influential sources of the idea of spiritual evolution. Although Mme. Blavatsky had a stuffed monkey in her New York apartment with a copy of Darwin's Origin of Species in its arm, thus expressing her derision for the scientific idea of evolution,11 she was greatly influenced by it. Her idea, briefly stated, is that mankind, under the secret guidance of obscure masters, the Mahatmas, is moving steadily toward a spiritually more advanced state just as the primate brain moved gradually toward progressively greater intelligence. Evolutionary ideas were pervasive in the nineteenth century and are found in art history (seeing art as evolving toward ever greater realism), philosophy (Hegel). economics (Marx), as well as other fields of knowledge. Something like evolution is found in Nietzsche whose heartless Übermensch seems to embody the qualities which make a species survive in natural selection. Many occult schools used ideas of spiritual evolution to give their work particular importance as the most advanced thought of mankind.

The idea of spiritual evolution is initially appealing, especially in its new age formulation that sees society as at last about to become benevolent. This idea however has a not entirely happy past. Evolutionary ideas in the nineteenth century could be distorted into theories which proposed that certain human groups are spiritually or otherwise inferior to certain others because they represented a lower phase of human evolution. This idea is certainly to be found in Blavatsky's writings though in a rather innocuous form. However, its association with racial theories makes spiritual evolution a suspect idea. Groups that hold it tend to end up proposing themselves as most advanced and finding that other, less advanced groups are to blame for the world's problems. Spiritual evolution exhales the scent of paranoid grandiosity.

Although Blavatsky attributed her ideas to her Indian "Masters," the theosophical idea of spiritual evolution is a misunderstanding of the concept of karma in Indian religion. Karma holds that each person's situation is the result of prior actions in this and former lives. Sentient life is painful and each being must eventually seek to be released from repeated rebirth. As all beings have performed innumerable harmful actions, to completely work off all accumulated unfavorable karma is virtually impossible and Indian religions propose various spiritual practices as methods for attaining release from repeated rebirth. In Buddhism the earliest method was the eightfold noble path but a variety of meditative and devotional methods are taught in its diverse traditions. Through many births, lives and deaths each being gradually works toward spiritual advancement so that he or she will eventually be born into a situation in which complete release can be obtained.

However, to use a scientific metaphor, the spiritual development of different sentient beings is not in phase. There is no general or overall improvement in humankind's spiritual state, only individuals who gradually improve themselves and eventually attain spiritual perfection. Although the Mahāyāna does often, notably in the *Lotus Sutra*, state that each being has the potential to become a Buddha and in a sense, already is, this does not mean we are in a spiritually advanced age in which human perfection is close to being attained.

Traces of an idea of spiritual evolution can be found in the Mahāyāna. The belated appearance of Mahāyāna teachings and sutras was explained by saying that the Buddha's hearers were at too limited a stage of spiritual development to comprehend these more advanced teachings. So they were entrusted to a certain few, such as Mahākāśvapa in the case of Chan, who received it wordlessly from Sākyamuni. Some sutras were committed to writing but guarded in the earth by Nagas until people who could understand them were available. This terma doctrine was mainly a device to explain the absence of Mahāyāna teachings in the earliest records of Sākyamuni's teachings but it does embody the idea that the Mahāyāna is more spiritually advanced than the earlier śrāvakayāna. Vajrayāna likewise teaches that it has passed beyond the earlier Mahāyāna. Within the Mahāyāna are various hierarchies of the different teachings with the one at the top invariably being that of the sect defining the hierarchy. Such hierarchies however are mainly synchronic; they are not a sequential progression over historical time. They do not propose a general spiritual advance over time but rather seek to explain the simultaneous existence of different and in part contradictory Buddhist teachings.

History is seen in contrary terms as progressive degeneration. Pure Land, possibly the last important Buddhist school to emerge, presented itself as a simplified practice inferior to the old but the only one that people living in a degenerate age could follow. This idea of spiritual deterioration, the decline of the Dharma, over historical time is in fact the predominant Buddhist vision of history. In Sakyamuni's time, many could be enlightened simply by hearing a teaching or seeing the Buddha. It later came to be accepted in both Theravāda and Mahāyāna that because of the inferior spiritual capacities of people in the present

age, enlightenment in this lifetime was impossible. To be sure, this idea was in part a justification for new practices, such as *nien fo* or tantra. It remains however that the direction of spiritual development of mankind as a whole was downward. Säkyamuni himself had prophesied the decline of the Dharma.

The Lotus Sutra does teach that everyone is destined to become a Buddha; each individual will over countless lifetimes eventually develop to the point of becoming enlightened and escaping the cycle of birth and death. This is an individual matter, however. While certain individuals are evolving toward perfection, mankind as a whole is not. Buddhism does not have an idea of social evolution. However, this idea of the gradual overcoming of karma and improvement in spiritual state was altered by Blavatsky and others to be a social or collective phenomenon rather than an individual one. While the idea of spiritual development over nearly infinite lifetimes does have a sort of similarity with Darwinian evolution, it is a mistake to see Buddhist cosmology as evolutionary. Rather, the idea of karma and rebirth was altered to fit Western preoccupations with the improvement of human society and give it an apparent spiritual basis. Spiritual evolution is related to Indian religious ideas but is a Western modification of them. There is nothing wrong with making such modifications; the history of religion consists of them. But pre-modern Indian religion does not contain this idea.

Spiritual evolution is not a scientific idea either. It cannot be measured or tested. Spiritual evolution may have been inspired by science but is outside the concerns of science. It is a religious borrowing of a scientific term for figurative purposes.

# Physics Mysticism and Oriental Religion

The claim of what I have termed "physics mysticism" is that quantum physics has confirmed truths that were recognized in the ancient Asian philosophies, especially Buddhism and Taoism. Most famous of all works in this area, of course, is Fritjof Capra's *The Tao of Physics:* An Exploration of the Parallels Between Modern Physics and Eastern Mysticism. The first and second editions together have sold more than one million copies worldwide and the influence of this book seems to have been immense.

Reading The Tao of Physics now, its ideas seem so familiar that one must remind oneself that they seemed fresh and exciting when the book first appeared over twenty years ago in 1975. Obviously it contained a message which many wanted to hear.

Yet a scholar or scientist taking up The Tao of Physics may find it hard to be favorably disposed toward a book whose first chapter contains the statement, "When I refer to 'Eastern mysticism' I mean the religious philosophies of Hinduism, Buddhism and Taoism. Although these comprise a vast number of subtly interwoven spiritual disciplines and philosophical systems, the basic features of their world view are the same."12 This is so completely erroneous that one is at first at a loss as to where to begin one's criticisms. Those who have devoted themselves to the study of these religions will be surprised to find that they are at root the same. But this sort of sweeping generalization is part of the reason for the popularity of The Tao of Physics. It is much easier to believe one understands a homogenized unitary "Eastern mysticism" than to devote the effort needed to understand the subtleties of several systems. There is a trace of imperialism here as well. In the same chapter Capra shows that there are differences between the teachings of early Western philosophers such as Heraclitus and Parmenides but asserts that those of the East have basically the same ideas as each other. One wonders already if Capra is really interested in understanding "Eastern mysticism" or whether he has a different agenda. Capra creates a generalized Orient where he locates certain ideas he wishes to fuse with physics. To give an Eastern flavor he illustrates the book with many of the Oriental religious symbols which now receive instant recognition from Westerners: the dancing Shiva, Yin and Yang, the I Ching hexagrams. Koans and familiar verses such as "I carry fuel, I draw water" are dutifully quoted from books by Alan Watts, D.T. Suzuki, Paul Reps and Philip Kapleau. Such phrases and images have become generally familiar but it is less evident that they have been understood.

An interesting question is what are the sources of this unitary "Eastern mysticism" assumed by Capra and others? Some have traced it to American transcendentalism and the thought of Ralph Waldo Emerson and William James. As mentioned above, Blavatsky is an equally important if less academically respectable source for the implicit idea that humankind is evolving toward a more spiritual state. The sources of "Eastern mysticism" as presented in popular Western books are most often other Western books. Certainly this is true of The Tao of Physics. The relation of these ideas to actual Eastern religion cannot be assumed. "Eastern mysticism" can seem compatible with Western thought because it is Western thought tricked out in Eastern garb. Like Chinoiserie in art which looks less Chinese the more familiar one is with real Chinese art, "Eastern mysticism" can be a caricature of actual Eastern thought. I am not suggesting that "Eastern mysticism" as described by Capra does not contain genuinely Oriental elements, simply that The Tao of Physics is unconcerned with judging the authenticity of its sources. If we read a Western book on Oriental religion and find that it resembles certain forms of Western thought, we should not be surprised. Capra is not aware of this issue. He is not

concerned to present Eastern thought accurately but to prove a thesis of his own. This is why he is not interested in differences in the Oriental religion. For his purpose their basic features are indeed the same. In the Afterward to the third edition, Capra does express some surprise that Eastern spiritual teachers he met after writing the book did not always agree with his ideas. I will return to this point later.

Capra states, "The birth of modern science was preceded and accompanied by a development of philosophical thought which led to an extreme formulation of the spirit/matter dualism."<sup>13</sup> This is a favorite conceit of Western writers on "Eastern mysticism;" that Western thought is dualistic whereas Eastern thought is not.<sup>14</sup>

It is assumed that dualism is bad and a cause of human unhappiness. Indeed Capra sees in this sort of split "the essential reason for the present series of social, ecological and cultural crises."<sup>16</sup> Would it were so. If all the miseries of the twentieth century were due simply to an elementary philosophical error, the solution would be well on its way. The mystics of the East, however, knew that "all things and events perceived by the senses are interrelated, connected and are but different manifestations of the same ultimate reality."<sup>16</sup> This idea may have some resemblance to Taoism but it is hard to find Buddhism here, since for Buddhism reality is impermanent, lacking in self-nature and unsatisfactory.

Capra quotes Aśvaghosa as translated by D. T. Suzuki as saving that "when the mind is quieted, the multiplicity of things disappears."7 It seems likely that Asyaghosa is referring to something quite different, an internal meditative experience in which the agitation of thoughts filling the mind settles down, that is to a clearing of the mind, not to a vision of the universe as all one. It is true that Buddhism sees everything as having one flavor, but this is quite different from an idea of ultimate oneness, for example in the Advaita Vedanta idea of the atman. Unity of all things is a common topic in mysticism but it might be argued that the distinctive attribute of Buddhist mysticism is that it does not present mystical experience as oneness with an absolute but rather as recognition of emptiness. Buddhist enlightenment is not generally conceived of as union with an absolute or unitary reality. Those who describe it thus are generally writers who have not taken the trouble to understand Buddhism but assume a priori that it is like other systems with which they are more familiar.

The Tao of Physics compares many aspects of modern physics to "Eastern mysticism." The persuasive power of the book seems to depend less on any one argument that on an accumulation of similarities. Although this can be an effective rhetorical device, it is logically fallacious method since a series of weak arguments is not more powerful because of their quantity. However, many are persuaded by such arguments.

# Limitations of Language

One important similarity claimed by Capra for physics and Eastern mysticism, is the inadequacy of language to describe their truths. "The problem of language encountered by the Eastern mystic is exactly the same as the problem the modern physicist faces.... Both the physicist and the mystic want to communicate their knowledge, and when they do so with words their statements are paradoxical and full of logical contradictions.""8 There follows a discussion of koans and use of paradox in Zen. Capra claims that paradox is a Chinese addition to Buddhism. Although he refers to Nāgārjuna, Capra is evidently unaware of the Prajñāpāramitā literature which is highly paradoxical. This is not to say that the Chinese did not further develop a certain method of Buddhist teaching which uses paradox. Because the Chinese developed a sort of paradox which is more poetic and less scholastically obscure than Indian paradox. Zen is more accessible today than Nagarjuna. Perhaps it does not alter Capra's basic argument that Buddhist paradox originated in India. Yet one is discomfited that for all his apparent admiration of "Eastern mysticism," Capra has not troubled himself to study it very carefully. He does not treat this part of his subject with the respect it deserves.

It is no doubt true that both the physicist and the "mystic" find language a difficult medium for communicating their truths to others. But this is generally true of human knowledge. We find the same inadequacy of language when we try to describe the inward experience of anything from the taste of a radish to the aesthetic pleasure of viewing a painting to our emotion over an important experience. Language is always the finger pointing at the moon. For example if I try to describe a painting by Ni Zan, a very influential figure in the history of Chinese art. I could list attributes such as dry brush strokes, use of a few suggestive lines with an absence of detail, an island in the middle with three bare trees on it, etc. I could say Ni Zan strives toward a spare elegance. All of these statements would give a picture to those who have seen Ni Zan's painting - memory would be stirred by them - but to one who had not ever seen this painter's work, no aesthetic experience would be evoked by them. Nor could I give in words a complete description of one of Ni Zan's paintings. Similarly, mystical experience is not generally fully evoked by reading or hearing about it, though there are exceptions: Hui Neng became enlightened upon hearing the Diamond Sutra recited.

Ineffability seems a shaky basis to unite two systems of thought. It is true perhaps that both physics and mysticism share a high degree of frustration with the limits of language. But this no more makes them similar in a deeper way than the paintings of Ni Zan resemble a radish because neither can be described in words. The inadequacy of language to represent the world has become a commonplace of modern thought. Mystics do complain of the inadequacies of language but so do lovers and others who want to express what is of importance to them.

Capra cites the now familiar dual nature of light as wave and particle as an example of paradox in modern physics. But this is less a contradiction in the nature of reality than a mixture of metaphors. No physicist would claim that light waves or particles exist the way stones and trees do, as direct objects of experience. They are metaphors of extreme explanatory power, but still metaphors. We are accustomed to seeing waves and particles as shown in diagrams in science texts but these of course do not at all resemble the invisible phenomena they represent. Waves and particles describe certain behaviors of light which can be better understood by using mental images of particles and waves. To be sure metaphors in science are different from those in literature in that they must be consistent with the measurements they summarize. In literature a metaphor is valid if it is aesthetically effective but in science it must summarize and predict attributes of the phenomenon it describes. A better term is "model" which implies a more complete and mechanical relationship than does "metaphor." However, the scientist's model easily becomes metaphor when taken outside the context of science.

Capra's habit of mind is to look for similarities and ignore differences. Consider this statement: "Eastern art forms, too, are forms of meditation. They are not means so much for expressing the artist's ideas as ways of self-realization through the intuitive mode of consciousness.<sup>79</sup> The only example given is Indian music. The assumption that certain non-Western art is closer to a deeper human nature has been criticized by Sally Price and others. Price comments, "Western enthusiasts of Primitive Art have always argued that its authors are in particularly close touch with the 'fundamental, basic and essential drives of life – drives that civilized man shares but 'buries' under a layer of learned behavior."<sup>20</sup> While Price is speaking primarily about African art and classes Oriental art with civilized art, it is evident that Capra is making a similar assumption that Oriental art is particularly close to spiritual truths which Western civilization has buried.

One can agree with the implication that Oriental art is more spiritual than most Western art, but still be troubled by Capra's statement. To begin with, it is too easy. One cannot look at Oriental art casually

and understand meditation. "Oriental art" is a more diverse category than is "Western art" and Capra's lumping suggests that he has rarely looked at it. Second, the experience of looking at a painting is quite different than that of sitting in meditation. Both can induce a feeling of calm or a sense of contact with spiritual truth. But they are simply different experiences. Art is an external support and most meditation is intended to eliminate the mind's dependance on external supports. Westerners with limited knowledge of meditation assume that it is a means of calming and tend to think of any quiet or peaceful experience as meditative. Indeed, the term "meditative" is often simply a synonym for "calming." As any meditator will report however, the experience of sitting meditation is often anything but calm. It is probably more correct to state that some Oriental art communicates a spiritual experience that has some relation to what is experienced in meditation. Ni Zan can be again mentioned in this context in that his work evokes a feeling of simplicity. Much other Oriental art - most Japanese ukiyo-e. for example - is not obviously meditative. Many Tibetan thankas represent images to be mentally visualized in meditation. Yet few of these complex or violent images are what most Westerners understand by the term "meditative." Tibetan thankas depict aspects of meditation that are not part of its popular conceptualization in the West. The relation of art to meditation or of aesthetic to religious experience are of great interest since both are perceived to give spiritual benefit. But it is not particularly useful to simply equate the two. A meditator would hold that meditation is far more that what is felt when casually viewing any work of Oriental art. Capra is not wrong to see a relationship between meditation and some Oriental art but he hardly illuminates it.

It is hard not to see *The Tao of Physics* as part of the contemporary tendency to be deceive oneself into imagining that the reading of one book or watching of one television series gives understanding of an entire area of human culture. It flatters the reader into imagining he or she has attained a sophisticated understanding not only of "Eastern mysticism" (conveniently all the same) but also of quantum physics and relativity simply by spending a few comfortable hours reading in one's arm chair. Obviously neither can be learned in this way. I am not at all against popularization but I am against the idea that reading a popular account can make one a sage. I place less blame on the person who reads *The Tao of Physics* or a similar book and imagines he or she understands "Eastern mysticism" than on the author who creates this flattering misconception.

The heart of The Tao of Physics seems not to be specific ideas but a general optimism that religion and science will bury their supposed antagonism and merge into an easily acceptable set of agreed principles in which the disturbing aspects of both will drop out. Physics is the science that invented nuclear weapons and therefore is often held to be responsible for one of the most disturbing events of the twentieth century. How reassuring it is to see that physics has gone beyond creating great powers of destruction and now is bringing us back to religious truth. It is part of the twentieth century's longing for a restoration of human brotherhood. Here the nuclear physicist and the ancient Chinese or Indian mystic are united.

Capra mentions in the Afterward to his third edition that many older people wrote to him thanking him for the book. The Tao of Physics is optimistic and reassuring. It suggests that adopting better ways of thinking will save the world from the ominous situation it is in. I do not disagree with this in principle although I do not expect it to happen soon. However, the idea is not new and not especially related to quantum physics. One project of science mysticism is to raise the prestige of religion by showing that its truths are confirmed by the most modern science. The corollary is also a goal. Capra states that his "book aims at improving the image of science by showing that there is an essential harmony between the spirit of Eastern wisdom and Western science. 21 While religion has been on the retreat before science for over a century, more recently science also has been on the defensive, itself charged with being harmful or repressive. If the science of physics which created the atom bomb is later seen as leading to religious understanding it becomes much more acceptable. One of Capra's projects is to change the public image of his science from being destructive to being spiritual.

Capra's physics mysticism can be compared to Theosophy which occupied a similar place in the last century. Both are assemblages of popular ideas, and while both contain ideas derived from the East they are essentially Western systems of extreme philosophical naivete which yet seemed to meet the spiritual needs of many in their respective eras. Both have an optimistic outlook and see themselves as enabling a new unity of humankind and capable, if taken to heart and understood, of bringing peace to the world. This, as much as any more purely intellectual appeal of their ideas is a part of their attractiveness. But this optimism is a variant of the Western idea of progress. One searches in vain in Buddhism and Hinduism for such beliefs.

# Science Mysticism and Collage

It has been said that collage is the most characteristically modern art form. Certainly the idea of taking preformed images and putting them together without the visual logic of realism is new to art history.

# Pacific World, New Series, No. 11, 1995

Nor is this confined to still art. In film or TV, montage substitutes for explanation. Viewers now accept a sequence of images without asking that they be connected. A character might be in New York in one scene and Beijing in the next without the need to show how he got from one place to another. One sees this in its fullest expression in rock videos which may be a series of images unrelated by anything other than by being titillating. The new discipline of "narratology" examines how linkage of events in literature or other kinds of writing such as history is not inherent but the result of narrative devices giving the illusion of coherence.

I propose that collage is the strategy of science mysticism. One takes highly abstract and paradoxical language from scientific writing and from mystical writing and puts them together. Just as the mind of the movie goer or the viewer of a collage constructs an apparent coherence out of an arbitrary assemblage of parts, so does the *Tao of Physics* bring together scientific and mystical discourse so that the mind of the reader supplies the mental sensation of connection. In the past this might not have been accepted, but in the postmodern era any things put side by side are interpreted, usually without critical awareness, as related. Anything can be the same as anything else by juxtaposition.

A similar point to mine is made by Henri Atlan.<sup>22</sup> About comparisons of physics and mysticism, Atlan states:

Languages and theories elaborated in a particular discipline and meaningful as explanations of the phenomena described at the level of observation characteristic of that discipline are transposed to other levels, corresponding to other disciplines where these... no longer have the same meaning; the superconductivity of solid state physics used to "explain" the nature of the modified states of consciousness produced by a technique of meditation, or... the mind of the observer, perhaps confounded by a cosmic consciousness, used to "explain" the paradoxes of quantum mechanics.... For most scientific researchers the outrageous nature of these transpositions is so evident... that one is astonished that they crop up with such regularity.

Language that is meaningful in describing one kind of phenomena can be transposed so that it seems to be a description of quite a different order of phenomena but loses its meaning when it is so transposed. However, this may not be self-evident to one who has no great knowledge of one or both orders of phenomena being described. Most readers of Capra have to take on faith that he is correct in his representations of both physics and "Eastern mysticism" and so his becomes a sort of

argument from authority. Atlan also points out that "the problem [of such ideas being taken seriously] arises only because of the social standing of the researchers; the same theses would have no impact were they put forward by undergraduates or non-scientists."<sup>23</sup>

In a telling passage in the Afterward to the third (1991) edition of The Tao of Physics Capra reveals the similarity of his method to collage. He describes having designed a photomontage while living in California, "a dancing Shiva superimposed on the tracks of colliding particles in a bubble chamber - to illustrate my experience of the cosmic dance on the beach... one day, in the late fall of 1970, when I sat in my apartment... I suddenly had a very clear realization. I knew with absolute certainty that the parallels between modern physics and Eastern mysticism would some day be common knowledge ..... 724 This collage is reproduced in the book as the frontispiece for the chapter entitled. "The Cosmic Dance."25 Other collages illustrate The Tao of Physics. One two page spread<sup>26</sup> has mathematical equations on the left and Sanskrit script on the right, both printed in reverse and both certainly equally incomprehensible to nearly all readers of the book. One wonders indeed if any reader understands both. But here they are, right next to each other, both mysterious; what is more natural than the conclusion that both express the same deep truth about the nature of the universe? A similar idea underlies a superimposition of a subatomic reaction diagram over a spread of the I Ching hexagrams.<sup>27</sup> The diagrams show subatomic particles called hadrons which "represent a flow of energy in which particles are created and dissolved, but the energy can only flow through certain 'channels' characterized by the quantum numbers conserved in strong interactions."28 Later in the chapter, Capra states, "The changes in the world of hadrons give rise to structures and symmetric patterns which are represented symbolically by the reaction channels.... In the I Ching, too, changes give rise to structures - the trigrams and hexagrams. Like the channels of particle reactions, these are symbolic representations of the patterns of the patterns of change."29

Both hadrons and I Ching do involve change – not by itself a very profound similarity. And in both instances the sequence of changes are represented diagrammatically. But then so are many kinds of change. The sorts of data susceptible to visual representation are literally infinite. The hadron diagram superimposed on the hexagrams is just that, a superimposition. There may be similarities at a visual level and in the aesthetic response they evoke. But they represent things that are otherwise quite different. The I Ching describes human situations whereas hadrons only resemble human life as a remote metaphor. Yin and Yang might be described as forms of energy but they are quite different from the forms of energy considered by physics. The I Ching was developed and used for divination. Would many physicists think divinatory accuracy of the I Ching is implied by an alleged similarity to hadron diagrams? It is evident that they would not. Even if one believes as, apparently did Carl Jung, that the I Ching could usefully explicate human situations because of the principle of synchronicity, does the efficacy of the I Ching have anything to do with subatomic particle physics? Again, only by metaphor.

On the cover and within the *Tao of Physics* is a Yin and Yang diagram in which the light or Yang portion is a cut out with integral equations on it and the dark phase is a portion, also cut out, of the face of a Buddha in the Gandhara style.<sup>30</sup> The entire face, lit in rather dramatic chiaroscuro is reproduced earlier in the book.<sup>31</sup> There it is incomplete as well since just the head is shown although whether this is due to cropping or the loss of the rest of the statue is not stated. Collage does not care about using images in their entirety.

This collage is of particular interest in that it brings together a Chinese symbol, an Indian Buddha and modern equations. It has the trick of good collage that things originally quite disparate seem to belong together so that we do not question their juxtaposition. This takes advantage of the remarkable ability of the human visual cortex to make a coherent picture out of scraps of visual information. There seems to be something profound in such assemblages. And maybe there is. However, experiencing aesthetic meaning in looking at a diagram has little to do with understanding its scientific meaning. To be sure, a fascinating or appealing diagram may invite one to try to understand what it displays. But this fascination is not scientific understanding. Understanding Capra's collage aesthetically does not make one able to solve the equations.

The same is true of the mystical side of Capra's collage. The sense of meaning — or the sense that there is a meaning — which one gets from Capra's collages is similar to what one might get from looking at a *yantra* whose meaning one does not understand or, a better comparison because it assembles multiple elements, a Vajrayāna mandala such as the wheel of life. But the sensation of meaning does not mean that one understands the content of these diagrams — which requires intense study. One may receive genuine aesthetic emotion from them but this is does not imply one understands their meaning as did the iconographer who designed them. Thus someone with no knowledge of Vajrayāna Buddhism might claim to understand a mandala aesthetically but should be aware that this does not imply understanding the meaning as do Tibetan monks who use it for meditative visualization. There is nothing wrong with this, provided one is aware of the limits of one's knowledge. A problem with *The Tao of Physics* is that it does not deal honestly with this sort of difference. It assumes this superficial impression is real knowledge.

Both "Eastern mysticism" and modern physics as described in words or in visual images may give rise to a sense of wonder at the strangeness and beauty of the universe and human consciousness. Reading about subatomic physics and "Eastern mysticism" can evoke similar aesthetic responses and in this sense they have a real similarity. But the aesthetic emotion arising upon seeing equations side by side with Sanskrit does not have much to do with solving a physics problem with mathematics or practicing meditation. I suggest that the high acceptability of science mysticism is due to the habit of accepting collage as a form of coherence. While bringing unlike things together may have aesthetic value and stir thought just as a koan does, it is not the sort of coherence that philosophical or scientific discourse must possess to be accepted as having meaning. In criticizing Capra's idea that quantum physics and "Eastern mysticism" are similar. I am not arguing that no similarities can be found but claiming that their similarities are not illuminating. It is not more useful to say that quantum physics and "Eastern mysticism" are different: rather they belong to different modes of thought across which comparisons have little meaning.

Another more interesting question which is not quite the one Capra addresses is this: can one accept both the findings of modern physics and the ideas of Oriental religion? This is a more meaningful question because it does not confound levels but inquires how a person can consider both areas of thought. The question of how to be both religious and scientific has been a very difficult one in the last two centuries. It is as difficult in the East as in the West. Capra's answer seems to be that both are the same and so there is no problem. A more useful approach would be to consider why, even though science and religion address different areas of human concern, they seem to be in conflict. What is at stake in the apparent conflict of science and religion and how does the combination of quantum physics and a Westernized "Eastern mysticism" seek to resolve these?

Henri Atlan addresses such issues. For him, "there are several rationalities, different modes of being right/reasonable/rational, all of them, despite their contradictions, legitimate ways of accounting for all the data of our senses."<sup>32</sup> This seems to me unavoidable though the issue of how these different modes coexist still remains. Indeed this is the postmodern dilemma, that our lives, our selves, our ideas are multiple and not reducible to mutual coherence. Capra, it seems to me, avoids this by trying to show that different modes are actually the same. This is denial and like all forms of denial prevents the important issues from being addressed.

## Pacific World, New Series, No. 11, 1995

#### Physics Mysticism and Contemporary Culture

I have argued that the thesis of *The Tao of Physics* is less than meets the eye, that the claimed similarity of physics and "Eastern mysticism" is a mirage, something created by placing two obscure subjects side by side and asserting that they are congruent. However, they are not similar in the light of stronger examination. Understanding physics does not help to understand mysticism, nor does the mystic have anything to contribute to solving the problems of modern physics. The mystic and physicist may indeed be pursuing their own ideas of truth but their truths do not overlap.

Does this mean then that The Tao of Physics is trash, another postmodern narrative of entertainment value only? I do not think so. It is not a contribution to informed understanding either of modern physics or of Asian religion. What else might it be? Capra himself suggests one answer in his Afterward to the third edition. He notes that total worldwide sales of The Tao of Physics were over one million and states that in his many lectures on its themes, "again and again I could witness how the book and my lectures generated a strong resonance in people.... Quite a few were old people.... I have come to believe that the recognition of the similarities between modern physics and Eastern mysticism is part of a much larger movement, of a fundamental change of worldviews...."33 He goes on to encapsulate the ideas contained in his second book. The Turning Point, that "the threat of nuclear war, the devastation of our natural environment, our inability to deal with poverty and starvation... are different facets of one single crisis, which is essentially a crisis of perception."34 These are the problems of fashionable worry - one assumes that the omission of gender will be remedied in a fourth edition - and we learn that they are all a matter of perception. If humanity changes how it perceives its world, these problems will be solved. This brings us back to Theosophy and to spiritual evolution which is now presented in the contemporary language of psychological development. "The new worldview is an ecological worldview that is grounded, ultimately, in spiritual awareness."35

One reason, then for the immense popularity of *The Tao of Physics* is that its message is an optimistic one. We no longer live in a cold, deterministic universe, and by changing our perception we can eliminate our era's seemingly intractable problems. We do not need to discard nuclear physics even though it has brought us the atom bomb nor do we need to give up religion. Indeed, the latest science confirms the oldest truths. Capra's ideas then are modern but avoid nihilism. The idea that a change in perception might transform human society is closer to Confucianism, an aspect of Chinese thought which Capra finds of

less interest because it is less "mystically oriented" than Taoism.<sup>36</sup> The changes in perception which Confucianism would advocate are unlikely to appeal to modern Westerners; *how* perception changes matters a great deal but those who predict a better world because of altered thinking rarely consider what would happen if the world were altered by other forms of thinking than their own. Here as elsewhere Capra presents pleasing ideas but does not really consider their difficulties. His goal, in the end, is to make his reader feel good. This is the goal of much new age literature but was certainly not the primary goal of Indian or Chinese religion which involves difficult ideas and practices. These are intended to lead to release from suffering but do not imagine this is possible without diligent effort.

There are some other ideas in The Tao of Physics which, I believe contribute to its being meaningful for so many people. Its descriptions do evoke a sense of wonder at the universe we find ourselves in. Popular science writing often seeks to engender a sense of pleasurable awe by describing realms beyond our senses such as the incalculable distances of space or the minute level of the cell. Mystical writing also strives to do this in a variety of ways including paradox as in Zen. The paradoxes of quantum physics are Zen-like in showing us the limits of our usual ways of describing the world. Modern cosmology with its vast times and distances is not unlike the scenes in some of the Mahāyāna sutras such as the Lotus or the Avatamsaka which include scenes which also stretch the imagination. Indeed the times and distances of science are greater than those of the sutras which do not seem as impressive, I suspect, to generations raised on science fiction. However, the ability of both science and mysticism to stimulate the imagination does not imply that the ideas they embody are the same. Nor is this sense of wonder the same as a true understanding of scientific or mystical truth.

The Tao of Physics is flattering. It does not condescend to its readers but suggests that they too will attain to an understanding of the profundities of "Eastern mysticism." This is a rhetorical strategy of other popular writers on Oriental religion, notably Alan Watts. In presenting Zen, Watts suggests while telling us that mere verbal understanding is not enough, we moderns are smart enough to become enlightened by hearing these ideas. Meditation, asceticism are not required. As with Capra, it is simply a matter of changing one's perception. How the change is to be brought about is not explained. There is certainly a similar idea in Buddhism and Taoism. Bankei, for example, taught that everyone can recognize the unborn in himself and that nothing difficult was required. Lao tzu and Chuang tzu also teach that happiness is attained by the right way of perceiving the world. But they present this change in perception as rarely attained. There is a complacency about Capra's ideas which does not do justice to the often demanding spiritual disciplines of the East.

The Tao of Physics addresses one of the most cognitively disturbing aspects of modern, or postmodern life: the tendency for reality to separate into autonomous modes without clear connection to each other. Thus, when I use one intellectual system to diagnose and treat a patient I am inhabiting a mental universe quite different from when I see an adventure movie or write a paper about Buddhism. Science and religion have regarded each other as separate, often competitive. Indeed they have often seemed to insist on a monogamous relationship in which one can be only scientist or religious but not both. Yet many people feel the need for both in their lives and are confused by this mutual jealousy of the religious and scientific modes of thinking. Capra's answer seems to be that while in the past science may have seemed to contradict religion, advances in this century show us that this was wrong, that science actually has belatedly recognized what religion understood twentyfive hundred years ago. We can therefore believe in both religion and science without worry about inconsistency.

While I agree that religion and science are not irrevocably contradictory, I wish that Capra would grapple more seriously with this issue. Why were science and religion seen as opposed? What has to be modified in both science and religion for them to become mutually compatible? Consider for example his discussion of the I Ching. Capra states that the "use of the I Ching as a book of wisdom is, in fact, of far greater importance than its use as an oracle."<sup>37</sup> Really? Is Capra unaware of the Chinese preoccupation with divination? Is there any reason to think that the prestige of the I Ching as a wisdom book was not dependent on its efficacy as an oracle? Can the I Ching be used by a scientist and if so how can its use be consistent with scientific attitudes? Capra, like Watts and many others, presents a sanitized "Eastern mysticism" in which superstitious elements are simply not looked at.

Capra seems only perfunctorily aware of such issues. There is no discussion in *The Tao of Physics* of how we as modern Westerners can know about "Eastern mysticism." What are the problems of comprehension? Do we just take from it what seems suitable and ignore other aspects or is there a problem in doing this? For example, what about rebirth, an idea fundamental to Indian religion but left out of *The Tao of Physics*?

Capra does admit in a single paragraph in the Afterward to the third edition, "I no longer believe that we can adopt Eastern spiritual traditions in the West without changing them in important ways to adapt them to our own culture." Does this mean Capra imagined his presenta-

tion of Eastern spiritual traditions in the earlier editions was not adapted to "our own culture"? Just what has to be changed is not specified nor is it considered how these Eastern teachings are to remain authentic after being adapted to our culture. Capra makes the interesting admission that, "My belief has been enforced by my encounters with many Eastern spiritual teachers who have been unable to understand some crucial aspects of the new paradigm that is now emerging in the West.'88 This is a sort of throwaway line which passes over very important issues. There is a contradiction implicit in it. If the "new paradigm" cannot be understood by Eastern spiritual teachers, then in what sense is it based on "Eastern mysticism"? It is hard to avoid the conclusion that Capra picked out what he liked from mainly popular secondary sources but was less pleased with "Eastern mysticism" when he encountered it in the flesh. There is no indication that Capra saw a reason to question his own superior insight when meeting "Eastern spiritual teachers" who do not understand the "new paradigm." Has he considered that the reverse might be true, that he is the one who does not understand? If he has such doubts, Capra omits them from his text.

The Tao of Physics pretends to challenge conventional thinking but does so, if at all, in an unthreatening way. The term "new paradigm" is a portentous cliché. Using such words suggests that the writer is in possession of certain knowledge of what the future will be like and we ordinary people had better harken to what he says or become superannuated. Saving that the world will change in a certain way and that others had best accept it often conceals desperation that it is not quite happening. We sense in Capra, though to a mild degree, the same dogmatism and frustration with those who do not accept his new paradigm that developed in the proponents of spiritual evolution. Tolerance of ambiguity is part of the new paradigm, but this tolerance does not extend to ambiguity about the truth of the paradigm itself. While the ideal of spiritual evolution seems a positive one - humanity is steadily developing into being inherently more virtuous - it tends to take an unpleasant turn when confronting human behavior which does not fit this scheme. What is to be done about those who do not understand? Most ominously this leads to inquisition or ethnic cleansing. Far more often it leads merely to impatience with those who disagree and an irritating proselytizing zeal.

Yet given the enormous appeal of Capra's work we must seek the positive values it does communicate to its many readers. If one believes, as I do, that the ideas of various Eastern philosophies have value not only as objects of academic study but as spiritual inspiration, then he has been able to express the appeal of these ideas as only a few, such as Watts and Suzuki, have done. These writers are seductive and seduction is a preliminary for the birth of something new. A book such as Walpola Rahula's What the Buddha Taught<sup>39</sup> is a far better representation of Buddhism in accessible terms than The Tao of Physics. But it is not seductive. Its appeal begins when the reader is already motivated, whether by intellectual curiosity or by acceptance of the first noble truth of suffering, to make an entry into the ideas of Buddhism. Far more Westerners have become interested in Oriental religious ideas by works like The Tao of Physics than by more scholarly ones. The term for this in Buddhism is upāya, or skillful means. If ideas are presented so as to lead others to truth, then they are effective even if not quite true in themselves. I wish better books on "Eastern mysticism" had the appeal of The Tao of Physics but our culture is still better off that this one exists.

If we step back from the problematic details of *The Tao of Physics*, we can see some of what others have found valuable in it. The great French scholar of Western esotericism, Antoine Faivre comments on it thus,

To maintain the dialogue between even the most scientific modern experiment and traditional symbolism is what Fritjof Capra... and others after him have done. There are those who, following Friedrich Schlegel who revealed the Orient to Europe, today study symbols, myths, archetypes, and make of comparative mythology a spiritual exercise that leads to a form of knowledge.<sup>40</sup>

Here Faivre also mentions Joseph Campbell. Faivre's summation subtly shifts the frame of reference. It is not a question of whether the truths of traditional symbolism anticipate science but rather of bring them together, of allowing science to pass into the mythic or poetic. This passage, however, is in a single direction. Science can be brought into myth but not myth into science. Quantum physics can be a way of apprehending the numinous but symbolism or myth do not serve in the laboratory. I am not denying that science never expresses itself in mythic terms, obviously it often has, as The Tao of Physics shows. But one cannot use myth to carry out a successful experiment as the history of alchemy shows. Alchemy's rehabilitation by C. G. Jung and others is as a symbol system, not as something which works in the way that science works. Science can stimulate the imaginal life but as it does so it ceases to be empirical science. This is a valuable use of science; one which is attractive to many people. As the popularity of science fiction shows, it is as much appreciated as the successes of empirical science. But it is not science in the proper sense.

#### Buddhism and Chinese Science: The Views of Joseph Needham

Recently the idea that Buddhism is scientific has eclipsed the earlier, opposite idea. However, there is one important scholar who held the contrary view: the great historian of Chinese science, Joseph Needham who remarks, "The study of Buddhism is apt to be unsatisfying to natural scientist and sinologist alike."<sup>41</sup> The central issue Needham addresses is why Chinese science did not develop as Western science did given the undoubted genius of Chinese culture and discoveries of importance in many areas. Needham places some of the blame on Buddhism: "in deciding what effects Buddhism had, when introduced into China, upon the development of scientific thought... so far as I have been able to see, these effects were very largely inhibitory...."<sup>42</sup> Needham makes two charges against Buddhism which shall concern us here. First:

Buddhism never lost the character of its primary refusal to give answers to questions which it considered unnecessary since concerned with things unknowable. A list of undetermined questions runs like a creed, it has been said, throughout Buddhist history. These were: (1) whether the universe is eternal or not... (3) whether the vital principle... is the same as the tangible body or not (4) whether after death the tathagata... exists or not. Perhaps this was another feature which made it inimical to scientific thought.<sup>49</sup>

The other inimical feature was the Buddhist doctrine that the ordinary world is an illusion. "It would seem almost impossible to overestimate the importance which the doctrine of maya (illusion) had in Chinese Buddhism; it was this which perhaps most of all made it incomparable with Taoism and Confucianism, and helped to inhibit the development of Chinese science."<sup>44</sup> Needham also notes that for Buddhism, "the highest level of truth was to be reached through a succession of negations of negations until nothing remained to be either affirmed or denied."<sup>45</sup> Needham's predisposition against Buddhism is evident in many places. He relies on the writings of its Confucian enemies such as Cheng Ching-Wang in the *Meng Chai Pi Than*. Needham's example is needed here to show that Buddhism does not seem scientific to every scholar.

Needham's views can be explained as a continuation of traditional Chinese attacks on Buddhism. I believe he reflects this nearly two millennium old prejudice by a sort of adopted patriotism sometimes found in the views of sinologists toward what seem to them un-Chinese elements. Still, it is of some interest to examine the validity of these charges. While I am not unappreciative of Needham's brilliance, I feel here he has failed to understand how sharply science differs from the sort of speculative thought which is the province of the humanist – whether historian or philosopher. To put it a little simplistically, scientists are attracted by answerable questions and philosophers by unanswerable ones.

Science restricts itself to studying what is testable with present knowledge and methods. To take a contemporary example, a lay person might imagine an immunologist to be working on discovering a cure for AIDS. The scientist himself however would be unlikely to describe his efforts in such terms especially to his own colleagues. Rather he might be studying the effect of a certain nucleic acid analogue on replication of HIV in lymphocytes. This sometimes is misconstrued by lay activists as a lack of concern. It is not; rather one cannot search for a cure for a disease, one can only try to extend one's knowledge by a small step, beginning with what is known and hoping that it will eventually lead to a practical application.

Now this attitude of science is, it seems to me, close to that of Śakyamuni: do not expend your efforts on what you cannot now know but do what is likely to bring practical benefit in relieving suffering. (Popular science writers love to speculate but actual scientists generally do not. This may be at times be a fault; science can be antagonistic to imagination.) The anti-speculative stance Needham attributes to Buddhism is not unlike the working method of science. Buddhism accords with science in its discouragement of speculation about questions which are not answerable in favor of those which are. It would be going too far to say that this Buddhist idea actually contributed to the development of science but it certainly does not conflict with it. One might equally say that Confucianism with its all consuming concern with regulation of behavior as the basis of the state discourages interest in intellectual inquiry which does not have human virtue as its object. I believe this to have to more to do with the limitation of development of Chinese science than Buddhism. In Confucianism, human life is improved by people from the emperor on down following already known rules, not by new discoveries about the natural world. As to the influence of actual Buddhist or other institutions rather than Buddhist ideas on Chinese science, Needham does not really take this up, nor shall I, as little is known about it.

Needham's second point seems to be that if the world is considered to be *maya*, or illusion, then there is no reason to be interested in studying it. Almost the same charge can be made against medieval Christianity which regarded the world as a vale of tears significant only as the location of efforts to gain salvation. It is hard to see Buddhism as inhibiting observation of the world if, for example, one looks at Chan inspired art. True, the artist's way of observing is different from that of

the scientist. Buddhism does not turn away from observing the world but rather does something different with its observations.

Science, though not always explicitly, depends on the idea that ordinary appearances are not the same as the reality which science reveals. The apparently solid and still paper on which this is written is actually make up of molecules separated by empty spaces. The molecules in turn are constituted of particles in rapid motion. In medicine, the difference between the physician's scientific explanation and the common sense understanding of the patient is fundamental; it is why people go to doctors – to find out a truer explanation of their illness. The test of truth in medicine may be blood tests or imaging methods which reveal an otherwise unseen reality. A blood culture may reveal the bacterium causing a life threatening infection. An MRI might reveal a cancer or, alternatively, may show that what the patient believed to be cancer is a harmless swelling.

Science then absolutely assumes that the world of ordinary observation is not the one which is real to it. There is a resemblance here, though I do not wish to push it too far, between science and the Buddhist idea of the two truths. In both cases, it is knowledge of the ultimate world which enables relief of suffering. The two truth theory is compatible with the attitude of science but does not require it. Ultimate truth as taught in Mahāyāna is not that taught in science. But in both science and Buddhism, the journey to understanding began with dissatisfaction with the limitations of what is revealed by the senses. It is hard to agree then with Needham, that the doctrine of māyā is inherently antagonistic to science.

Joseph Needham considers Taoism, in contrast to Buddhism, to be proto-scientific in its outlook. Richard H. Jones has criticized Needham's views, largely correctly in my view.<sup>46</sup> Jones' essay is also a very useful corrective to popular characterizations of science and Eastern mysticism as similar. Jones points out that the values of the Taoist which are held to derive from observation of nature are not of necessity values of the scientist, although they can be. Jones points out that the sort of observation recommended in the Chuang tzu is really quite unlike scientific observation. Some Taoist values, especially the disdain for accumulating abstract knowledge, cannot be consistently held by scientists – although one might argue that these are not to be taken literally. Jones' most telling point is this: "That the tranquillity Taoists claim is not routinely claimed by scientists in the West should be sufficient to see that the tranquillity could not have come through framing tentatively-held hypotheses or any similar understanding.<sup>87</sup>

This last point is a central one here. The result of religious knowledge is, at least in Taoism and Buddhism, liberation from limited views of reality and from suffering. Science does liberate us from many kinds of limitation - I can fly to China in less than a day - but not from limitation in general. Religious knowledge aims to do just that.

Possibly Jones goes too far in denying any similarity between Taoist observation and scientific observation. To be sure Lao tzu and Chuang tzu do not teach us to develop testable hypotheses or general principles but to preserve or restore the ability to respond to nature in a fresh way. The value of this freshness is not that it might enable creative development of new concepts but that it makes people able to be happy within themselves. This is not the apparent goal of science — though it does seek to discover ways to make human life better in a material or physical sense. But many people use science or popular science writing to generate a similar sense of wonder at the richness of nature. A Taoist might enjoy reading about science but he would not be doing so as a scientist. Indeed reading Lao tzu or Chuang tzu also can, for some, restore this sense of wonder. It is not that Taoism is scientific or that modern science has rediscovered truths once understood by Taoist philosophy but that both can freshen our response to the world.

Needham suggests that it is the tantric form of Buddhism which "may have produced some contributions to science<sup>748</sup> because of its use of "electrical imagery in the vajra," because of its use of sexual imagery, and because it has resemblances to the shamanic elements in Taoism. While this idea is interesting, documentation that tantrism stimulated scientific thinking is wholly lacking. It is true however that vajrayāna does advance explanations in terms of natural forces but they are not the sort of forces understood by science. It is hard to see that Needham is doing more here than expressing his preferences for some idea systems over others. It is not apparent that tantra with its intense interest in magic and proliferation of charms and amulets is more scientific than other forms of Buddhism. Waddell clearly thought it was *less* scientific.

Why then should Needham have singled out Buddhism among the strains of Chinese thought to blame for the limited development of Chinese science? It seems clear that his is the traditional charge leveled against Buddhism throughout its history in China: Buddhism is a foreign religion and therefore unsuited to the Chinese genius which is best reflected in Taoism and Neo-Confucianism. This foreign influence can then be seen as inhibiting the development of science in a way otherwise natural for the Chinese.

I have nothing new to say about this age-old Chinese controversy except to point out that in other aspects of Chinese culture: ink painting, sculpture, vegetarian cuisine, even neo-Confucian philosophy, Buddhism's influence has been extraordinarily fruitful. While Taoism may have proto-scientific elements, it did not lead to development of the sort of science which arose in the West either; no Chinese philosophy did. Needham apparently relied upon Edward Conze for much of his information about Buddhism.<sup>49</sup> Conze enjoyed mystification and liked to present Buddhism as something strange and not easily compatible with Western ideas. Conze's ideas about Buddhism are interesting but at times perverse — he tended to overstate the degree to which Buddhism differed from Western rationalism.

While Needham finds shamanistic and magical practices of interest, perhaps because of dubious theorizing that these were the progenitors of science, he is dismissive of claims made for meditation. Needham does admit that it was believed that deep insight could be produced with meditative techniques, but emphasizes more lurid examples of special abilities such as materialization of emanation-forms, levitation, telepathy, mind reading, and control of body temperature and other autonomic functions. He does allow "there is undoubtedly a basis of fact in these physiological games, the investigation of which is a worthwhile study, but they can hardly have served any more useful purpose than to impress ancient and medieval princes and people, who were highly partial to them."50 Despite conceding here that yoga or meditation merits study and that there might be a basis of fact in claims made for it, Needham is not interested in them and denies that the Chinese had any legitimate interest either. No doubt he is right that there is an element of titillation in demonstrations of vogic powers. But he passes over the claims of meditation as a means of direct observation of the working of the mind and indeed does not seem to consider that there might be useful modes of perceiving reality other than science. Nor does he consider positive reasons for the appeal of Buddhism for the Chinese.

Needham reflects the materialist and technological bias which represented the mainstream of Western thought in the first half of this century. Perhaps the scientific or technological aspects of Chinese culture are closer to our own and therefore easier to understand. Needham's great labors have been to show that Chinese culture has accomplishments something like the West's greatest achievement — science. He is, therefore, less able to consider elements that are different such as yoga. But one might well argue that the ways in which China is like the West are of lesser interest. Though there may be some Christian practices which resemble meditation, this art has not been brought to full development in the West and therefore meditative techniques, sometimes thought of as spiritual technology, may be of particular importance for the West.

There are fundamental difficulties in trying to explain why Chinese science, for all its attainments, did not develop into systematic science as known in the West. For one thing, it is not clear that the Chinese wanted it to develop in that way; it cannot be assumed that their goals were the same. More fundamentally, it is difficult to understand why science did not develop in one culture when we have no certain account of why it did develop in the Christian West. To single out Buddhism (or any other idea system) as in part responsible for this assumes that science *should* have developed in China but did not and, therefore, that something went wrong which can be identified. This is the mode of explaining other cultures as unsuccessful versions of our own.

Even if one does wish to account for the lack of development of Chinese science, it is not clear that what is also due to history and institutions can be accounted for on the level of ideas. Christianity has been claimed to discourage science by its unworldliness or to foster it by stimulating a search for God's laws regarding natural phenomena. As I have shown above, similar contradictory claims can be made for how the ideas of Buddhism or Taoism might have encouraged or inhibited the development of science. Understanding the nature of Chinese science does require understanding the intellectual milieu which included the three religious/philosophical systems. However, the implication that one or two of these stimulated science and the other inhibited it is hard to justify.

More recent scholarship such as that of Toby E. Huff approaches the question of why science did not arise in China by considering the nature of Chinese social and political institutions. In the West, scientific societies were formed which were largely self-governing. In China, the imperial government consistently kept organizations from developing autonomy which might make them capable of resisting the power of the central government. As Huff summarizes, "The problem of Chinese science, however, was not fundamentally that it was technically flawed, but that Chinese authorities neither created nor tolerated independent institutions of higher learning within which disinterested scholars could pursue their insights."51 The famous Chinese examination system which seemed to select those of superior intellect for government office was essentially the same from the Ming dynasty until its elimination in the twentieth century 52 and did not include science at all. Those with scientific aptitude or knowledge had no preference for influential positions in the government. Indeed, a conception of science as a special branch of human learning does not seem to have developed in China.

In Huff's formulation, which seems to me to be close to the last word on the subject, it was social and political institutions rather than religious ideas which kept science from developing in China. The conception of Buddhism as anti-scientific arises as a misinterpretation of Chinese intellectual history resulting from forcing a parallel to Euro-

pean history in which science emerges with a long and bitter struggle with religion. If there was an oppressive factor impeding intellectual progress in China it was governmental rather than religious institutions. (Western rulers were often interested in science and supported it financially.) The various persecutions of Buddhism in China can be explained similarly as attacks on an autonomous institution which might resist imperial authority. Buddhism represented an institution within which truth could be pursued in a disinterested, that is not politically regulated, fashion. Of course Buddhism did not always achieve a fully disinterested search for discovering truth nor did science in the West. In Chinese history however, Buddhism is more a force for intellectual independence than one for suppression of freedom of thought.

My purpose here has not been to attack Joseph Needham, a scholar for whom I have profound admiration. Rather it has been to illustrate another set of views of the relation of science to Buddhism than those currently fashionable. Needham's arguments do serve to make us examine more critically the contemporary commonplace that Buddhism is a scientific religion. Whatever compatibility Buddhism may be found to have with contemporary scientific ideas, through nearly all of its history it was associated with very different ways of thought.

# Is Buddhism a Scientific Religion?

If we conclude that science and mysticism do not really share the same ideas, there is a related but more modest claim which remains to be investigated: whether a particular religion, in the present case, Buddhism, can be considered to be a religion particularly compatible with science. We have set aside the idea that Buddhism or other forms of "Eastern mysticism" had somehow discovered what quantum physics has discovered. However, a religion or philosophy might be scientific in other ways, notably it might use some of the methods of science for investigating matters within the sphere of religion. In this case it would make different kinds of discoveries but would appeal to scientists because of a methodology more rigorous than those more usually associated with religion. It remains to consider certain aspects of Buddhism in relation to science.

There are several ways in which Buddhism has been said to resemble science: that it does not rely on unsupported faith or on authority to persuade its believers of its validity, that it is atheistic or at least does not depend on a belief in divine or supernatural beings, that it is empirically based. These share the idea at their root that Buddhism does not depend on non-scientific modes of knowledge. These propositions can be criticized as referring to an historically novel form of Bud-

dhism which is essentially the creation of Western scholars and admirers over the past century and a half. Viewing Buddhism as it has been for most of its history and still is for most of its followers today, faith and authority, belief in deities and lack of concern for empirical validation have been as prominent in Buddhism as in other religions. It is for the modern, usually, but not always, a Westerner, who did not grow up in the milieu of traditional Buddhist practice, that Buddhism can be in accord with these claims of a scientific character. I would not argue, though some have, that these modern forms of Buddhism are not really Buddhist at all. But they are a distinctively new form of Buddhism based on the need to assimilate modern forms of thought and to meet the spiritual concerns of an elite educated in the Western style which is now one of Buddhism's major constituencies. As religious revalorizations often do, this new form of Buddhism returns to earlier forms where it finds ideas more like its own which are considered truer to the religion's original spirit than current institutional practice. While a new form of Buddhism is as valid religiously as older ones, intellectual honesty demands that we acknowledge how the new form differs from the old rather than uncritically accepting its claim to simply represent what Buddhism has been all along.

### Faith and Authority

Westerners usually understand Christianity as requiring assent to its doctrines on the basis of faith rather than rational or empirical proof. Faith that one can be saved by belief in Christ is essential to salvation although one may be helped to have faith by the action of divine grace. It is not my purpose here to inquire further into the role of such ideas in Christianity but simply to point out that empirical evidence is secondary in Christian epistemology. Christianity has often seemed to fall back on external authority as the basis for belief in its ideas. It is evident that this is not the method of science, at least not in principle. In actual science, authority of course plays a role in the acceptance or rejection of ideas but is not final. Thus Semmelweis was reviled for proposing that failure to wash hands was the cause of the transmission of puerperal fever, but it was not long before his finding was accepted and obstetrical practice modified in accordance.

A variety of currents in Western intellectual history have produced unwillingness to accept authority as the sole reason for belief; these include the rise of Protestantism, Marxist and other revolutionary ideologies and the discovery through exploration of peoples with quite different ways of life. Argument from authority is considered in the positivist strain of Western philosophy to be a logical fallacy. This leads to

a search for other means to discover truth. Protestantism substitutes the individual conscience for church authority, at least in principle, but faith is still the way to truth.

As presented in the West, some Oriental religions do not require faith and do not insist on an authoritarian basis that they be believed in. Buddhism and Taoism fit most clearly here but certain aspects of Hinduism have also been made to seem so. Now while generally unremarked upon, because none of these religions have been indigenous (until very recently) in the West, they can attract followers only on a voluntary basis. In practice most religions tend to use subtle coercion to attract and hold their followers. Stephen Butterfield<sup>53</sup> describes how his teachers taught that anyone abandoning his vows to persevere on the Vajrayāna path would be reborn in hell. This is not particularly different from Christian threats to the same effect and shows that Buddhism in practice can have authoritarian features unattractive to Westerners.

One reason that Oriental religions seem less authoritarian is that their establishment does not yet exist with any degree of social power in the West. There have been enough scandals about abusive behavior of leaders of Eastern derived cults to lay to rest any idea that power over the believer is never an element in Eastern religion. The status of the teacher requires that his direction not be questioned. While Eastern religions lack an international hierarchy comparable to the Roman Catholic one, the authority of individual teachers is considerable. But there is a difference. Eastern religion can be authoritarian; but this does not imply that it must be based on authority. The authority is on a community level rather than a global one. The teacher's authority is great but the choice of the guru is still left to the individual. There is nothing comparable to the Western counter-reformation in which the Church attempted to control religious beliefs totally. Accepting the guru's authority is no more than an expedient means toward enlightenment. Buddhism does often lapse into authoritarianism but is not in principle authoritarian.

# Buddhism, Agnosticism and the Supernatural

The claim that Buddhism is atheistic or agnostic is also based on a selective understanding of the Buddhist tradition. It is true that there is no supreme divinity equivalent to the Judeo-Christian or Islamic God. However, rather than rejecting deities, Buddhism was open to nearly all as shown at length by Matsunaga.<sup>54</sup> Modern Buddhist apologetics often presents these deities as aspects of the mind, following the psychology of C. G. Jung. It is apparent, however, that most Buddhists

past and present have considered divine figures such as Amitābha, Guanyin, Tārā, and Jizō to be quite real and potential sources of external help. Fear of ghosts is prominent in Buddhist cultures and is not usually mitigated by conceiving them as mental only. But it is true that nothing in Buddhism is violated if one considers deities or spirits to exist only in the mind. Buddhism here is not necessarily scientific but can be scientific – it is untroubled if we regard its deities in Jungian fashion as elements of human consciousness, but it certainly permits belief in them as real. It is most accurate to say not that Buddhism is agnostic but that it permits agnosticism.

In his modest and engaging little book, A Scientist Looks at Buddhism Mansel Davies, formerly Professor of Chemistry at the University of Wales, presents Buddhism, primarily Theravada, as a way of thought consistent with science. The book is refreshingly personal and free of the immoderate claims and portentous language found in works like The Tao of Physics. In his conclusion, Davies lists nine aspects of Buddhism that are of personal importance to him.55 One of these is denial of the supernatural. Davies is well aware of supernatural elements in Buddhist writings and art but seems to consider them later additions. In this he is in a long tradition of Western Buddhist apologists who make Buddhism a rational religion by considering its deities and other supernatural elements to be adventitious. It was assumed that there was a philosophic Buddhism believed in by the educated elite and a superstitious popular form for the unlettered. This once commonplace idea has been effectively refuted and is no longer held by Buddhist scholars. To cite one example, complex rituals for the welfare of dead relatives were supported by the literati elite in China and still form the most important source of revenue for Buddhist temples in Japan. Much interesting current scholarship on Buddhism concerns itself with just these elements.56

Davies' view of Theravada Buddhism form illustrates the latest development in the long line of accommodation described by Matsunaga. As Buddhism can assimilate originally foreign gods, so can it assimilate modern agnosticism. While individual scientists are not necessarily agnostic, positivism tends toward the agnostic position. Buddhism does not deny the supernatural but allows its followers to deny it as one intellectual option. Or nearly does so. Some elements of Buddhism, such as rebirth, which were clearly taught by Sakyamuni do seem to involve something supernatural in that it is not affirmed by modern science. Despite many claims that rebirth has been proved<sup>57</sup> it has not been proved in the way the law of universal gravitation or that HIV is the cause of AIDS have been proved. I choose this latter example advisedly as a situation where much is contested and yet, despite occasional questionably motivated attempts to question or deny that HIV is the cause of AIDS, the finding has stood because of its overwhelming empirical verification.

I do not think we need to say that Buddhism cannot be a scientific religion because historically it has included many beliefs which now seen unscientific. Contemporary "scientific Buddhism" is yet one more of Buddhism's many historical forms; like earlier revalorizations it rearranges Buddhist ideas and practices. A Buddhism without deities is no less Buddhist than one with belief in hungry ghosts, but it is also no more Buddhist. But it should not be overlooked that a scientific Buddhism leaves out many of the features which have been most important to the generality of Buddhists.

### **Buddhism and Creation**

Buddhism does not have a creator god and never holds out to know everything about the world. For this reason it is not threatened by new discoveries such as quanta of light or with protons or neutrinos simply because they were not present in Buddhist scriptures. It does have an elaborate cosmology which is not consistent with modern astronomy but the details of this cosmology are not very dearly held by Buddhist spiritual leaders and only rarely has there been concern that astronomical findings would threaten Buddhism by contradicting its cosmology. Nor has Buddhism greatly interested itself in the ontological status of its Buddhas, Bodhisattvas and deities. One can read the Saddharma Pundarīka, Avatamsaka and similar sutras without worrying about how or where the elaborate Buddha fields there described actually exist. Buddhism does not (usually) insist that its spiritual imagery be taken literally or materially; indeed it sometimes warns against doing so.

Buddhism's lack of a theory of divine creation fits easily with scientific thinking. It should be recalled that the greatest antagonism between Christianity and science has concerned the apparent refutation of the Biblical account of creation in seven days by the direct action of God. Science's creation theories – such as the big bang – are seen as opposed to the Biblical account. (It could be argued however, that the big bang, to the extent that its account of creation is *ex nihilo*, does resemble the Genesis account.) Evolutionary theory has also been troubling to Christianity. It harmonizes more easily with Indian ideas, Hindu as well as Buddhist, in that the latter see sentient beings in a hierarchy of awareness and engaged in a pattern of spiritual ascent in which each gradually advances over millennia. Earlier, I have shown how the idea of spiritual evolution is a distortion of the Indian ideas of karma. My point here is that there is a similarity between the idea of spiritual advance in India thought and biological advance in Darwinism which makes them to some degree compatible, though not identical.

Buddhism does have a cosmology which differs considerably from that of Western science but its nature is such that it can be considered as a metaphor without weakening the Buddhist edifice. Cosmology never had the centrality that creation has in the Judeo-Christian tradition. Buddhism never committed itself to a particular ontology of its divine elements which could be contradicted by modern psychological or anthropological conceptions of such beliefs as metaphorical or archetypal. On the contrary, what Matsunaga termed the "Buddhist philosophy of assimilation" invites, or at least accepts, the entrance of new ways of thinking into the complex mixture which makes up Buddhist doctrine. While such procedures are not absent from Christianity<sup>58</sup> they are never explicitly acknowledged as legitimate. From its beginning, however, Buddhism has tended to assimilate rather than refute the indigenous beliefs of the new cultures to which it propagated, although often instituting ethical reforms such as the elimination of blood sacrifice and negation of caste differences. In Tibet it allowed elements of Bon to persist; in the modern West, Copernican, Darwinian, and Jungian ideas are permitted to coexist as if they had been Buddhist all along.

A scientist approaching Buddhism now, especially as presented in the West, can decide that its lack of insistence on ontological or cosmological theories gives it relatively few points of unavoidable contradiction with science. It is therefore more comfortable than a religion which insists on a creation process quite different from that of science. In practice however, Christianity and Judaism, in their modern discourse, usually retreat from their creation myths so that contradiction is avoided. Eastern religions do this more easily because they were never involved in a struggle with science for intellectual supremacy and therefore lack the taint of having resisted science.

Buddhism's central concern is relief from suffering in a world seen as inevitably unsatisfactory. This accords with such motifs in modern (or postmodern) thought as the psychotherapeutic view of human problems and the disenchantment resulting from awareness of events such as the holocaust and the use of nuclear weapons. Western religion is widely, if implicitly, seen as failing to have prevented these events. In contemporary popular psychology, people are viewed as unhappy because of neuroses or "hang-ups" which are to be removed by therapeutic procedures. Buddhism is then seen not as a set of metaphysical or cosmological beliefs but as a therapeutic system. Like much of popular psychology, Buddhism sees self-knowledge as the way to relief from suffering and so is apparently compatible with current ideas of psycho-

therapeutics. Buddhist meditation can be viewed as a method — indeed meditation is sometimes considered to be a psychological or spiritual technology. Christian ideas of spiritual practice such as prayer are less easily seen as psychotherapy. Since psychotherapy is often considered to be a scientific approach to human suffering, perceived similarities of Buddhist spiritual practice make the latter seem to be a scientific spiritual path.

I do not intend to further explore the assumed similarity of meditation and psychotherapy in the present paper, but merely to point out that this is one way in which Buddhism has been presented as compatible with modern ideas. However, Buddhism did not until recently present meditation as a form of psychotherapy and most of Buddhist practice does not fit this model. One example would be *ngondro*, the preliminary practices of Vajrayāna, such as doing 108,000 prostrations. While one might devise a modern seeming justification for physical austerities as promoting fitness, they are a part of the asceticism of the Buddhist tradition which has tended to be ignored in accounts of Buddhism as scientific. Once again however, Buddhism is not violated if these are re-explained as justified by health concerns. Some practices, such as lack of heat in Chan monasteries, is less easily so justified and thus usually not considered in accounts of Buddhism as scientific.

What is most regrettable in the presentation of Buddhism as scientific is that it leaves out or marginalizes certain practices which have been of central importance for Buddhists for millennia. An example is the lighting of incense to help the well being of deceased relatives. From a scientific point of view, this practice is superstitious. When viewed anthropologically as an effective means of dealing with grief, the viewpoint differs from that of the practicing believer who feels she or he is carrying out an obligation the neglect of which would really harm the deceased.

I am not denying here that Buddhism can be seen in ways which are compatible with modern scientific views, but simply reminding that this is a new way to see Buddhism. So far as we can tell Śākyamuni did not see himself as a psychologist teaching people how to be happy and well adjusted but as a religious teacher showing the way to permanent and complete relief of suffering. The two, while not totally different, are not identical.

# Empirical Inquiry in Buddhism and Science

A final and perhaps the most important claim to evaluate is that it is specifically the method of intellectual inquiry of "Eastern religion" which is scientific. This need not involve the assertion of *The Tao of*  *Physics* that these religions have understood natural phenomena in the same way as quantum physics but simply that their *method* is scientific. This is a narrower claim for similarity of Buddhism and science and therefore a more plausible one.

Buddhism has been said to be an empirically based religion because it asks that its followers accept it only if they have tried it and found that it works for them. I have discussed this aspect previously in a review<sup>59</sup> of Frank J. Hoffman's Rationality and Mind in Early Buddhism<sup>60</sup> which I consider to be the most philosophically rigorous analysis of whether Buddhism is scientific. Hoffman shows that Buddhist empiricism is not the same as scientific empiricism. Like Davies, Hoffman confines his attention to early Buddhism, though with greater recognition of the difficulties of reconstructing it. Hoffman does agree that Sākyamuni as represented in the Pali Suttas proposes that the spiritual inquirer try the Dharma for himself to see if it works rather than taking it on the authority of the Buddha's word. In contrast to science however, early Buddhism does not contemplate the possibility that its hypotheses will be refuted. Science, especially as represented by Karl Popper, acquires knowledge as incorrect hypotheses are falsified and less incorrect ones can take their place. In Buddhism, the basic ideas - the nature of existence as dukkha, anicca and anatta, the Eightfold Noble Path, twelvefold dependent origination - are not really refutable. The scientist who refutes a theory remains a scientist. But in Buddhism if one found for example that existence is not impermanent (anicca) one would either have to keep practicing to realize impermanence or one would cease to be a Buddhist. In the latter case, Buddhism as a whole would continue to accept impermanence. Science, however, persists as its theories change and because its theories change. Religious ideas change too but their change tends to be denied or explained away by religion.

One way to formulate the distinction is that Buddhism is experiential — one proves it to oneself by one's own experience but not fully empirical in that its ideas are not proved publicly by experiment. Nor does Buddhism as a whole acknowledge movement toward a greater degree of knowledge in the way science does. New theories in the Mahāyāna were explained as original teachings of the Buddha, concealed until such time as humans were ready to understand them. It is individual knowledge which is incomplete and advances in Buddhism until it reaches the final point of enlightenment which is already understood by the religion. For the individual, but not for Buddhism as a whole, knowledge does progress by a process of stripping away error. In mindfulness meditation as taught in Theravāda, for example, one examines the phenomena of the mind and comes to see for oneself their

true nature. Understanding ones' true nature is not a matter of learning metaphysical concepts but experiencing these phenomena without mistaken preconceptions which otherwise prevent one from recognizing them to be suffering, impermanent and not self. The metaphor of cutting off delusions is a common one particularly in the Mahāyāna but not inconsistent with Theravāda ideas. This does have an analogy with the scientific process of formulating a theory, finding it to be incomplete in practice and replacing it with a better one.

I think it is true then to say that Buddhism can involve approaching spiritual matters with a spirit of inquiry and skepticism. One in a sense attempts to repeat the experiment of Sākyamuni under the Bodhi tree but it is taken as a certainty that if one does so in the proper manner and has sufficient ability, one will arrive at the same truths. Despite this difference, Buddhism can feel comfortable for a scientist because his or her spiritual practice will beneficially use attitudes similar to ones he or she has been trained to employ in arriving at truth in the practice of science.

Buddhist empiricism is especially close to the empiricism of medicine. Both are employed to relieve human ills and are interested primarily in their success at this. They are only secondarily interested in finding general principles or universal rules. Hence they are unlike classical Western science with its desire to discover fundamental rules of nature. Clinical medicine is in this respect not completely a science and the same is true of Buddhism. Of course clinical medicine likes to find out why its cures are effective, but it is happy to employ them while waiting for more complete understanding. Its attitude is like the Buddha in the parable of the man wounded with a poisoned arrow. One pulls it out without waiting to find out who shot it, what direction it came from and so on.

The French philosopher of science Gaston Bachelard, who devoted his later career to study of the poetic imagination, described the method of science in somewhat different terms than Popper's as "the consciousness of a mind which founds itself as it works on the unknown and seeks in reality contradictions to previous knowledge.<sup>261</sup> Although Bachelard's concept of science recognizably resembles Popper's in that science proceeds by proving previous theories false, its spirit is quite different. The scientific method has become poetic, almost religious, in its confrontation with the unknown, something that would have seemed impossible from the sober writings of British positivists. Bachelard seems less interested in the factual content of science than in the inner mental life associated with it. Viewed from this perspective, science is more compatible with Buddhism. While Buddhist theories and scientific ones have little overlap, the mental processes employed have a certain analogousness. One form of Buddhist spiritual development is a meditative process of noting and discarding erroneous views, especially the reality of the self. So the motion of mind from error to recognizing error to struggling past error is perhaps similar in science and Buddhism, even though the content of the knowledge so developed is different.

We usually study science - especially popular science - with respect to what seems to be correct. Learning science is learning facts and theories. The same is true of religious doctrine. But for Buddhism, final truth, though it can be known, cannot be described except by indirection. This two truth theory is most fully developed in the Mahāyāna but has precursors in early and Theravada Buddhism. Science has an implicit theory of conditional and absolute truth. What we know now is incomplete and uncertain; it is conditional. Science is a process of moving closer to final truth, although it is unclear if this will ever be reached or not. It certainly cannot be known now. Science does not describe absolute truth but conceives that its activity is to move toward it. This absolute truth is not imagined to exist now but is a potential to be strived for without necessarily believing it can be fully realized. In Buddhism absolute truth cannot be communicated verbally, but it does exist now and enlightened beings possess it. For ordinary Buddhists however, it is also approached slowly and incompletely through a process of gradually eliminating error.

The Mahāyāna Buddhist vows that while delusions are limitless he or she will eliminate them all. Truth is found by recognizing errors. The Theravada meditation technique of vipassana involves meticulously observing thoughts and realizing that the conceptions one had about one's own mind were incorrect. The fundamental kungan in Chan, still widely used in Korean practice, is the "hwa do," or, "what is it?" This is addressed to all arising mental contents and is a way to question everything. The more intellectual method of Nāgārjuna is to dialectically eliminate all seemingly possible positions as errors. Many of his statements are statements about what is false. Thus, "The Blessed One has said that all dharmas that are delusive (mosa) are unreal (mrsā). All the mental formations (samskāras) are delusive. Therefore they are unreal."62 (Nāgārjuna: Mūlā-mādhyamaka-kārikā 13 verse 1.) David Ross Komito summarizes Nāgārjuna's Seventy Stanzas by saying, "The whole point of Nagarjuna's discourse in the Seventy Stanzas is to convert mistaken conceptions into correct beliefs and, eventually, valid cognitions.\*3

Thus in the Mādhyamaka, knowledge arises from a process which begins by identifying error. In this sense Buddhism's method is something like that of science though more in the mood of Bachelard than of Popper. This does not mean, however, that what Buddhism discovers about the universe is the same as what science discovers. Both proceed by finding errors but the errors each locates are of different kinds and the sort of provisional and final truths of each are different. Science might wish to discover the molecular causes of cancer as a part of the explanation of human suffering. Buddhism would teach each individual to identify the erroneous conceptions – for example that he or she has a coherent, permanent self – which cause suffering at the prospect of death. These are explanations at different levels and for different purposes.

By this analysis, Buddhism is closer to science than is revealed religion in the way it seeks truth. A revealed religion begins by stating what is true. The false can then be identified as that which does not accord with these truths. Such religions begin with truth and move to error. Buddhism teaches its followers to search for erroneous conceptions and eliminate them. It begins by finding error and moves to truth. Science also moves from error to truth. The result of this progressive elimination will be true knowledge or at least a better approximation of it. Clearly, however, the way error is eliminated is different. The scientist manipulates material objects in the laboratory while the Buddhist meditates. Having spent innumerable hours in both activities I can say that they are alike only in often being tedious. What does seem similar is the intellectual activity of finding and eliminating error. This can make Buddhism more attractive than revealed religion to someone trained as a scientist.

However compatible Buddhism can now be made to seem with the spirit of scientific inquiry, it cannot be denied that for most of its history and for most of its followers, Buddhism's appeal was not its apparent positivism. Rather, its appeal was the ostensible efficacy of its ideas and practices for the human purposes for which other religions are used: as a source of ethical guidance, for help in affliction, as a means of ritual care for the dead, and as explanation of the strangeness of existence. The credibility of such practices was not based on the sort of empirical proof that science now uses but on other sorts of persuasion. Nor was intellectual inquiry the interest of most Buddhists. For many, Buddhism, like other religions, provides answers before questions are asked.

It is worth pointing out it is not necessarily to the disadvantage of Buddhism that its method is not exactly that of science. To label a way of thinking scientific is often taken in a normative way as implying approval. Yet religion continues to exist in part because people feel a need to deal with matters – such as the nature and meaning of death – about which verifiable propositions cannot be made. The positivist project of eliminating concern about all matters which cannot be studied by empirical testing has not succeeded because it ignores human spiritual needs. And it has its own logical flaws. It fails to recognize that science's theoretical underpinnings also rest on unverifiable axioms. A. J. Ayer's *Language, Truth and Logic,* one of the clearest statements of the positivist position, proclaims in an apocalyptic voice that the principle of verifiability means the end of philosophical speculation. Non-verifiable propositions are dismissed as unintelligible without taking up the question of why many very intelligent humans have spent their lives considering them. Like Capra, Ayer seems to announce the arrival of a new state of mind which will solve human problems with a shift of thinking.

Empiricism becomes problematic and destroys its own ground when it insists that it is the only method for testing propositions. People make non-empirical decisions all the time — whether to believe in God without considering them to be meaningless. The Buddha's well known refusal to consider certain questions such as whether the arhat exists after death does bear a resemblance to positivism but a limited one since only certain questions are dismissed. But it is like science in its focus on questions of direct importance, which can be answered with available methods, rather than spending precious time on matters which cannot be decided.

### Science and the Newness of Buddhism in the West

In the modern West, we have a heritage of regarding Christianity as historically resisting the discoveries of science. With the counterreformation, the Church tried to suppress freedom of thought about religious matters. It insisted that Galileo recant his finding that the earth is not stationary but moves around the sun. Darwin's theory of the origin of man from lower animals by natural selection is still contested by some Christians. Because Christianity was the dominant Western religion during the arising of science, it was with that religion that the struggle with science for the dominant paradigm of reality was fought. Hence there is a remembered bitterness against the Christian religion, that is not felt toward Asian religions which were not involved. Whatever ways Buddhism might have retarded intellectual progress which is not to say that it did retard it — were not experienced in Western culture.

Buddhism has been presented to the West mainly by scholars. In general such individuals were highly educated and presented Buddhism in accord with the ideas of their own time which were already scientific. To be sure we have seen that there were also attacks on Buddhism as superstitious or monstrous (Waddell) but the former voices predominated. Thus Christianity entered Western consciousness through the mentality of the ancient world while Buddhism entered through the

mentality of the modern one. When one encounters Buddhism in its original Asian contexts, however, the impression is much different. Old people praying and lighting candles in a church in Italy and those in a Buddhist temple in Taiwan reciting mantras and lighting incense are doing very similar things. Both religions are practiced by many in ways that many of the educated elite would dismiss as superstitious. For Westerners, the Buddhist versions of these practices are far from sight and hearing, but for Christianity they are not.

One realizes the importance of such associations from talking to people in Asia many of whom, like many Westerners, are not particularly religious. In 1989, I gave a series of medical lectures in Korea. When told I was a Buddhist, several of the physicians there expressed incredulity. To them, Christianity was the scientific religion and Buddhism was superstitious. This is in part due to the association of Western scientific medicine with Christian missionaries. What the Koreans present thought of in connection with the two religions were not matters of doctrine but the historical association of Christianity with scientific medicine and Buddhism with the pre-scientific culture of Asia before colonization. In that frame of reference, Christianity is indeed the more scientific religion. There are now Buddhist hospitals in Asia, though not many, but they are of course modeled on the Christian idea of religiously affiliated institutions. The context in which a religion is encountered greatly influences how it appears.

# Conclusion

This review has been a critical one. I hope however it is not taken to conclude that science and Buddhism have nothing in common. Such is not my belief, nor the belief of the many of others who have considered the matter. Rather, I want to argue against a too easy equation of very different systems of thought which has often tended to obscure both. To say that Buddhism (or Taoism) is simply an older formulation of what is expressed in modern physics tends to make it too pat, just another version of what we already know. But Buddhism teaches about matters we do *not* already know except in the special sense that we are all already enlightened. One interested in modern science may find the analogies with Eastern religion helpful in beginning to understand the latter, but then must leave the comparisons behind as he or she advances in understanding of Dharma. This is itself a standard Buddhist idea – the raft is left behind after crossing to the far bank of the river.

As Buddhists and scientists, if we are too complacent that the two systems are easily compatible then we will lose the opportunity of using each to criticize and improve the other. If Buddhism has a spirit of

### 114 Pacific World, New Series, No. 11, 1995

empirical inquiry, then this inquiry must be continuing. We cannot say Buddhism is a scientific religion and, therefore, consistent with scientific ideas unless we actively test this hypothesis for ourselves. This is what Śākyamuni meant in admonishing his followers to be a lamp unto themselves. The intellectual relations between science and Buddhism must be rigorously investigated, not accepted as a comfortable truism.

# Acknowledgments

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# Notes

- <sup>1</sup> Fritjof Capra, The Tao of Physics: An Exploration of the Parallels Between Modern Physics and Eastern Mysticism.3rd edition, updated. (Boston: Shambala 1991).
- <sup>2</sup> Mansel Davies, A Scientist Looks at Buddhism (Sussex: The Book Guild 1990), pp. 59-60.
- <sup>3</sup> L. Austine Waddell, Tibetan Buddhism: with its Mystic Cults, Symbolism and Mythology and in its relation to Indian Buddhism(London: W. H. Allen & Co.; reprint, New York: Dover Books 1972), pp. 8–9.
- <sup>4</sup> Ibid., p. 14.
- <sup>5</sup> Ibid., p 15.
- <sup>6</sup> Alfred Jules Ayer, Language, Truth and Logic, 2d ed. (New York: Dover 1952).
- <sup>7</sup> Thomas S. Kuhn. The Structure of Scientific Revolutions2d ed. (Chicago: University of Chicago Press 1970).
- <sup>8</sup> C.G. Harrison, *The Transcendental Universe*, ed. and with an Introduction by Christopher Bamford (n.p. 1893; reprint, Hudson, N.Y.: Landisfarne Press, 1993), p 63.
- <sup>9</sup> Ibid., p 68.
- <sup>10</sup> Ibid., p 76.
- <sup>11</sup> Peter Washington, Madame Blavatsky's Baboon: Theosophy and the Emergence of the Western Guru (London: Secker and Warburg 1993), pp. 44-45.
- 12 Capra, p. 19.
- <sup>13</sup> Ibid., p. 22.
- <sup>14</sup> The popularization of the idea by D.T. Suzuki and its use to foster Japanese nationalism in the form of *nihonjinron* is discussed in an important article by Robert H. Sharf ("The Zen of Japanese Nationalism," in *Curators of the Buddha: The Study of Buddhism Under Colonialism*, ed. Donald S. Lopez, Jr. (Chicago: University of Chicago Press,1995), pp 107–160.) Sharf finds Western sources for this idea and questions whether they are to be found in traditional Zen. Capra's ideas of Zen are derived from just this modern presentation of Zen by D. T. Suzuki which Sharf criticizes as being Western in origin. While I think Sharf overstates the extent to which Suzuki's ideas are of Western origin, the issue is an important one. Capra shows no awareness of the pitfalls of relying on secondary sources for his ideas about "Eastern mysticism."
- 15 Ibid., p. 23.
- <sup>16</sup> Ibid., p. 24.
- 17 Ibid.

<sup>20</sup> Sally Price, Primitive Art in Civilized Places (Chicago: Chicago University Press, 1989) p. 32 (The inner quote is from Paul Wingert).

- <sup>21</sup> Capra, p. 24.
- <sup>22</sup> Henri Atlan, Enlightenment to Enlightenment: Intercritique of Science and Myth, trans. from the French by Lenn J. Schramm (Albany: State University of New York Press, 1993), p. 29.
- <sup>23</sup> Ibid., p. 29.
- <sup>24</sup> Capra, p. 324.
- <sup>25</sup> Ibid., p. 224.
- <sup>26</sup> Ibid., pp. 128-129.
- 27 Ibid., p. 260.
- <sup>28</sup> Ibid., p. 268.
- <sup>29</sup> Ibid., p. 282.
- <sup>30</sup> Ibid., p. 302.
- <sup>31</sup> Ibid., p. 92.
- <sup>32</sup> Atlan p. 2.
- <sup>33</sup> Capra, p. 324.
- <sup>34</sup> Ibid., p. 325.
- <sup>35</sup> Ibid., p. 326.
- <sup>36</sup> Ibid., p. 113.
- <sup>37</sup> Ibid., p. 110.
- <sup>38</sup> Ibid., p. 340.
- <sup>39</sup> Walpola Rahula, What the Buddha Taught (New York: Grove Press 1959).
- <sup>40</sup> Antoine Faivre, The Eternal Hermes: From Greek God to Alchemical Magus. trans. Joscelyn Godwin (Grand Rapids: Phanes Press, 1995), p. 68.
- <sup>41</sup> Joseph Needham, with the Research Assistance of Wang Ling, Science and Civilization in China, vol. 2, History of Scientific Thought (Cambridge: Cambridge University Press, 1956), p. 396.
- 42 Ibid., p. 396.
- <sup>43</sup> Ibid., p. 403.
- 44 Ibid., p. 405.
- 46 Ibid., p. 424.
- <sup>46</sup> Richard H. Jones, "Concerning Joseph Needham on Taoism," chap. in Mysticism Examined: Philosophical Inquiries into Mysticism (Albany: State University of New York Press, 1993), pp. 127–146.
- 47 Ibid., p. 136.
- 48 Needham, p. 426.
- <sup>49</sup> Richard Gard, personal communication.
- <sup>50</sup> Needham, p. 402.

<sup>&</sup>lt;sup>18</sup> Ibid., p. 46.

<sup>&</sup>lt;sup>19</sup> Ibid., p. 39.

- <sup>51</sup> Toby E. Huff, The Rise of Early Modern Science: Islam, China, and the West (Cambridge: Cambridge University Press, 1993), p. 318.
- <sup>52</sup> Ibid., p. 277.
- <sup>53</sup> Stephen Butterfield, The Double Mirror: A Skeptical Journey into Buddhist Tantra (Berkeley: North Atlantic Books, 1994), p. 11.
- <sup>54</sup> Alicia Matsunaga, The Buddhist Philosophy of Assimilation: The Historical Development of the Honji-Suijaku Theory, A Momumentica Nipponica Monograph (Rutland and Tokyo: Charles E. Tuttle Company, 1969).
- 55 Davies, p. 170-174.
- <sup>56</sup> For example, Bernard Faure, Chan Insights and Oversights: An Epistemological Critique of the Chan Tradition (Princeton: Princeton University Press, 1993) and Stephen F. Teiser, The Scripture of the Ten Kings and the Making of Purgatory in Medieval Chinese Buddhism (Honolulu: University of Hawaii Press, 1994). The approaches taken by these two scholars are very different, with the first being rather Foucaultian and the second that of history of religions. Together they make it plain that beliefs and practices of East Asian Buddhism contained much that would now be considered superstitious and that economic motives on the part of monks and institutions were not unheard of.
- <sup>57</sup> Martin Willson, Rebirth and the Western Buddhist, 2d ed. (London: Wisdom, 1987).
- <sup>58</sup> Jean Seznec, The Survival of the Pagan Gods, Bollingen Series XXXVIII (n.p. 1953; reprint, Princeton: Princeton University Press, 1972). Thomas F. Mathews, The Clash of Gods: A Reinterpretation of Early Christian Art (Princeton: Princeton University Press, 1993).
- <sup>59</sup> Geoffrey P. Redmond, Indian Journal of Buddhist Studies 2 (1990): 81-83.
- <sup>60</sup> Frank J. Hoffman, Rationality and Mind in Early Buddhism(Delhi: Motilal Banarsidas, 1987).
- <sup>81</sup> Quoted from La Philosophie du nonin Mary McAllester Jones, Gaston Bachelard Subversive Humanist (Madison: University of Wisconsin Press, 1991), p. 173.
- <sup>62</sup> Quoted in Thomas E. Wood, Nagarjunian Disputations: A Philosophical Journey through an Indian Looking-Glass(Honolulu: University of Hawaii Press, 1994), p. 287.
- <sup>89</sup> David Ross Komito, Nagarjuna's "Seventy Stanzas": A Buddhist Psychology of Emptiness (Ithaca: Snow Lion, 1987), p. 48.