

Cross-Cultural Consensus Between Buddhist Reality and Modern Science

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Even though Buddhism and modern science are disparate in function, it is highly likely that the tenets of Buddhism have stirred interest among scientists at various stages, because some of the ideas spoken of in Buddhist sūtras can be compared with sophisticated scientific principles. The first evidence of scientific interest in Buddhist doctrines was in the latter part of the 19th century, gradually increasing until the present day and today there are many evidences of significant cross-cultural consensus between Buddhist reality and modern science.

In this essay we will look at why these two seemingly incompatible disciplines are able to reach some consensus. We will approach the topic first from the standpoint of a fundamental Buddhist doctrine, dependent origination. From there we will move on to look at the pathway of major contacts and examples of consensus which have taken place between science and Buddhism over the past forty years. Finally, we will conclude with a review of dialogues on diverse scientific issues, which were initiated in the 1980s, and have continued on an annual basis, between the Tibetan Buddhist community and various groups of Western scientists.

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I. Introduction

Buddhism originated around 2,500 years ago in India, with the teachings of Śākyamuni Buddha, and since then, has become one of the world's major religions. For the greater part of 2,500 years its influence has been solely in the East, and it differs intrinsically from the scientific approach developed in the West. In the Buddhist philosophical and religious system perfect enlightenment is the ultimate goal, whereas, in Western science, a principle or a theory is acquired through the process of scientific research. Such research usually proceeds in several stages including, gathering common phenomena experimentally, analyzing phenomena, organizing results, simulating an equivalent mathematical model, and formulating an hypothesis. If the hypothesis is confirmed to be correct by a series of precision experiments, the final mathematical equation is formulated as a principle and explained in plain language.

Even though in modern times religion and science are mutually disparate, as mentioned previously, it is certain that scientific interest has been aroused from time-to-time to take a closer look at the tenets of Buddhism. Western scientists reading Buddhist *sūtras* are sometimes greatly inspired by a simple passage, because the profound meaning of certain passages is comparable to a sophisticated scientific principle which has been obtained through a long period of successive experiments and verifications. Such passages are frequently located in *prajñāpāramitā* texts. For example, short expressions such as, “all things are impermanent”, “all things have no self”, “form does not differ from emptiness”, and so on, are very meaningful as they have application also in contemporary chemistry, physics and other sciences.

Paul Dahlke, a German physician, was born in the late 19th century and lived until early in the 20th century. Dahlke described his

first contact with Buddhism and its effects on him thus “It was not in the shape of an emotional shock or of some decisive event that Buddhism entered my life. Slowly, imperceptively, like the seed in the ground, did it take root and grow when in 1898 I started on my long voyage to Ceylon (Sri Lanka now).” He visited Sri Lanka several times in order to study Buddhism, and later, he became a disciple of Pandit Wajiswara a famous Buddhist scholar. Dahlke was the first scholar in relatively modern times to write about the correspondences between Buddhism and science. He wrote a book titled *Buddhism and Science* where he proposed that Buddhism is a scientific religion that teaches us to accept reality on its own terms (Dahlke, 1913:254-255).

Dr. Lee Kookju, a former professor of Seoul National University, in his book titled *The Science of the Diamond Sūtra*, said that, while Buddhism is generally considered to be a philosophy or religion, in its Enlightenment premise it is deeply scientific (Lee, 1983).

Moreover, when scientists encounter the basic doctrine of dependent origination, with a description that was quite simple for non-specialists to understand even 2,500 years ago, it is possible to formulate this principle as a sophisticated mathematical equation possessing various multiple variables, by approaching the profound wisdom of this doctrine according to modern scientific methods. In respect of a scientific viewpoint, Buddhist tenets are more closely aligned with theories such as the so-called new physics of quantum theory, relativity theory, and other modern physics, than to conventional physics based on Newtonian mechanics. It is because of this that there are particular principles of the new physics which have a deep consensus with Buddhist realities.

Why is it that principles of modern science, which were the motive power for today's glorious Western civilization, can now find some consensus with tenets of the 2,500 year old Buddhist tradition? I suggest that it is because these fundamental tenets of Buddhist doctrine, such as the doctrine of dependent origination, are based on the reality of nature. The following is a quotation from Chinese Āgama, which is the Buddha's explanation about the origin of the basic doctrine of

dependent origination.

“Whether there is an arising of *Tathāgatha* or no arising of *Tathāgathas*, that element still persists, the stableness of the *Dhamma*, the fixed course of the *Dhamma*, specific conditionality. *Tathāgatha* awakens to this and breaks through to it. Having done so, he explains it, proclaims it, establishes it, elucidate it. And what, *bhikkhus*, is dependent origination? ‘When this exists, that comes to be; with the arising of this, that arises (T.2.85b21-c2).’”

This explanation makes it clear that, from the beginning, dependent origination is a natural law that is always dependent on a condition of reality for every thing. Therefore, I suggest that this Buddhist tenet can find consensus with modern science, even though modern science is based on experimental observation of natural phenomena and theoretical analysis of data from findings.

Moreover, in the Buddha's moment of Enlightenment he acquired pure knowledge of the *dharma* sphere, and therefore he attained six unhindered supernatural powers. Among the six powers, there is reference to so-called clairvoyance. Buddhist clairvoyance is an ability to observe perfectly the suffering and happiness of sentient beings, far and near, by using intuition through meditation. The ability to cognize the suffering and happiness of sentient beings is related to psychology and other disciplines such as cognitive science, neuroscience, psychiatry, and so on. Further two abilities are related to today's physics. With these two abilities the Enlightened One can perfectly observe the whole physical world in detail, from a macro vision of the operations of the universe to the finest micro detail, such as the action of elementary particles in a subatomic world. In some passages the Buddha described certain phenomena as he saw them with his heavenly eye (clairvoyance), and these are comparable to the principles of modern science, hence, scientists have become interested in Buddhist teachings. Even great twentieth century physicists, such as Julius. R. Openheimer, Niels Bohr, Werner Heisenberg, have expressed the thought that a complementary relationship between science and Buddhism would contribute to the

development of modern physics (Capra, 1991).

In general, when scientists, with their rational and realistic way of thinking, encounter Buddhist teaching, their interest is usually stimulated and they attempt to study it from a comparative perspective. Moreover, there are also scientists who are themselves Buddhists and live in Buddhist countries who sometimes write scientific commentaries on Buddhist tenets in order to expound the superiority of Buddhism as a scientific religion. Yet, it seems that a more active consensus between science and Buddhism can be reached when there is direct dialogue between the Buddhists and scientists, particularly as a way of shedding light on thorny issues of modern physics, by applying the Buddhist skillful thinking and intuitive insights, and because this is so, Western scientists have been dialoguing regularly with the Tibetan Buddhist community since 1987 (Zajonc, 2004). Here, we will loosely review the stages of major contact and consensus which have occurred between Buddhism and science, and then examine some excerpts from the published proceedings of the cross-cultural direct dialogue which is continuing between the East and the West.

II. Evidence of Consensus between Buddhism and Science

Although the primary purpose of Gautama Buddha's teachings is to liberate sentient beings from suffering, it is also possible for scientists to find sound scientific premises throughout the teachings, as essentially they are based on the realities of nature and human being. This is why there is a proliferation of books on comparative studies between Buddhism and science in Buddhist countries such as Korea and Japan. Here, however, I will discuss the evidences of consensus which have occurred in the West where natural science was born and later developed into modern science, although the major religion of the West is quite different from Buddhism.

1. Buddhism and World Theory

In 1913, a book titled *Buddhism and Science*, the first of its kind, written by Dr. Paul Dahlke (1865-1928), was published by Macmillan and Co., London. This book had quite an impact on English speaking audiences as it brought an understanding of Buddhism to the West. The author states that Buddhism is a doctrine of reality, and its value, from the standpoint of epistemology, lies in the fact that it teaches us to accept reality as it is. He also says that Buddhism is a world theory which supports absolute and universal law, while science is materialistic, and apprehends the play of world events by way of mechanics. Dahlke emphasizes that every scientific law, without exception, is an abstraction from experience, and may be swept away again by fresh experiences.

In the early part of the book Dr. Dahlke also approaches world theory and Buddhist doctrine from a scientific viewpoint, and later, he discusses Buddhism in depth, in relation to problems encountered in physics, physiology, biology, cosmological questions, and other issues. He insists that Buddhist doctrine, based on the law of truth as a universal value, is superior to science with its many problems. While his description is, in a sense, partly speculative, I suspect that the book might have given fresh food for thought to the Western Christian society with its absolutist values. In addition to the publication, *Buddhism and Science*, Dr. Dahlke also did a German translation of Buddhist *sūtras*, *Dhammapāda*, *Majjhima-Nikāya* and *Dīgha-Nikāya*. He also established 'Buddhist House' in Berlin where he lived on his mature years as a kind of renunciant layman, spreading Buddhism throughout Europe.

2. Modern Physics and a Vision of Eastern Mysticism

In the West, there has been a long history of conflict between religion and science and over the centuries many scientific tenets were dismissed due to their incompatibility with revelation. This has caused some scientists to water-down their explanation by adopting two-pronged scientific and religious doctrines, thus, avoiding dwelling on points of incompatibility between the two. By the latter part of the 20th

century however, there were attempts being made to transcend the split between science and religion, by seeking parallels between the insights of modern physics and Eastern mysticism. A representative book on this theme is *The Tao of Physics* written by Dr. Fritjof Capra (Capra, 1991). In this book Dr. Capra refers to Eastern religions and philosophies, including Buddhism, Hinduism, Taoism, Confucianism and others, under the heading of mysticism. It would seem unreasonable to refer to rational religions such as Buddhism and Confucianism, as mysticism, but perhaps the contemplative insights obtained by Eastern religious practitioners could be considered mystical to the eye of a Western physicist. Nevertheless, *The Tao of Physics* has gained great popularity and has been responsible for stimulating worthwhile thought and debate in both East and West.

Dr. Capra was a researcher in theoretical high-energy physics at several famous universities, and worked as a lecturer at University of Berkley, California. Later, he turned ecologist and he is now working as Director for the Center for Eco-literacy in Berkeley. When he was young he was very interested in Eastern mysticism and undertook a thorough study in order to attain wide and deep knowledge of the subject. As a result, he began to see parallels with modern physics. He found that some of the concepts of modern physics showed surprising parallels to ideas expressed in the Eastern religious philosophies and, from this view, he suggested six new-paradigm ideas for science (Capra, 1991:328-335). He supported his ideas with persuasive quotations from Eastern religious scriptures, as well from the writings of many distinguished scholars who were leaders in modern physics in the twentieth century.

In his book, Dr. Capra refers to Buddhism as a major mystic religion of the East. Moreover he says that scientists may lead us - putting it in extreme terms - to the Buddha or to the Bomb it is up to each scientist to decide which path to take. He added that the path of the Buddha, the 'path with heart', cannot be overemphasized. It is commendable that he considers Buddhism a most compassionate religion.

3. Buddhism and Scientific Viewpoints

In 1984 a book titled *Buddhism and Science* was edited by a well known interplanetary biologist and evolutionary scientist, Dr. Buddhadasa Kirthisinghe. It was published by encouragement and support of the Buddhist Publications Society in Kandy, Sri Lanka. This book is a compilation of learned articles written by scientists who have outstanding knowledge in Buddhism as well as their specialty fields. Nine scholars from America, England and Sri Lanka contributed 23 articles covering Buddhism, biology, biochemistry, nuclear physics, cosmology, psychology and anthropology.

There are very many interesting topics such as exobiology, galaxies and *śūnyatā*, Buddhist meditation and bioscience, *karma*, rebirth and genetics, science and the *skandhas*, and science and the wheel of life etc. There are also commentaries on the Charles Darwin's revolutionary theories such as evolution, natural selection and mutation, considered in the light of Buddhist ideas of *dharma*. The topics which especially aroused the interest of Western people were the articles on cosmology. In these articles there are research findings of famous astronomers such as Prof. Fred Hoyle of Cambridge University, Carl Sagan of Harvard University and others, which confirm similarities between observed realities and Buddhist tenets. These astronomers believe in a steady state of the universe, with no beginning and no end. They also believe that our galaxy has some 640,000,000 earth-like life bearing planets.

4. Choosing Reality

When we consider the formation background of the principles of modern physics, we can see that various theories were applied in defining the macroscopic properties such as time, space, matter, etc., as well as unseen properties such as field, energy, ether, etc., and organizing them with mutual relations. Although there is widespread agreement among physicists concerning the use of mathematical

techniques, validity of empirical data, and the value of certain models of physical processes, there is still a fundamental divergence of opinion concerning physical reality. The most basic problem is the relation between physical theory and physical reality.

Many scientists in the nineteenth century adhered to a view of physics which is referred to these days as scientific realism, which is that true physical theory represents an independent objective reality. Even today many scientists still follow this metaphysical view. During the latter part of the nineteenth century, however, scientific realism was challenged by such physicists as Ernest Mach, J. C. Maxwell. Their views are closely related to a philosophy of science now known as instrumentalism. The debate between the views of both sides remains unresolved in contemporary physics, but few physicists today express much concern about this controversy.

In 1996, however, an epochal suggestion about how to resolve the debate was presented by Dr. Alan Wallace in his book *Choosing Reality*. In this book he presented an analysis of both views and proposed a radical philosophical alternative, based on the Buddhist Centrist view. Avoiding both the pitfalls of realism and instrumentalism, as well as materialism and idealism, this perspective focuses on the participatory nature of scientific observation and theorizing. The book, which by the way has the subtitle *A Buddhist View of Physics and Mind*, explores the implications of this view in understanding space, energy, quantum, universe, a contemplative view of body and mind, refining human consciousness, and even worlds in harmony.

Dr. Alan Wallace studied physics and history of science at Amherst College where he later earned an M.A. He also attained a Ph.D. in religious studies at Stanford University. Having trained for ten years as a monk in Tibetan Buddhist monasteries in India and Switzerland, since 1976 he has taught Buddhist theory and practice in Europe and America. He has also served as an interpreter for numerous Tibetan scholars, including His Holiness, the 14th Dalai Lama, and in particular, he has been a full participant as an interpreter in the series of 'Mind and Life' conferences, which we will discuss in detail later in

this article.

In 2003 Dr. Alan Wallace published a new book titled *Buddhism and Science* and dedicated it to the then-deceased Dr. Francisco J. Varela, who co-founded the 'Mind and Life' meetings and who had worked as a coordinator until he unexpectedly passed away in 2001. *Buddhism and Science* includes fourteen excellent articles selected from the 'Mind and Life' dialogues, and examines the contrasts and connections between the worlds of Western science and Eastern spirituality.

III. Consensus through Direct Dialogues

As previously mentioned, attempts to seek parallels between insights in modern physics and in Eastern religious thinking had already begun not long after the middle of the 20th century. At that time Western scientists began to seek out Eastern religious views in a desire for direct dialogue which might bring to light newer ways for research as well as help them to overcome some confronting problems. A dialogue naturally, requires two parties and in their search for a suitable partner they found a willing participant in His Holiness, the 14th Dalai Lama, Tenzin Gyatso. I will not go into any background introduction here about the Dalai Lama as his position and activities are already well known. The Dalai Lama once said that ever since his youth he had been greatly interested in science and technology and had thought that he might have become a scientist or engineer if he could have chosen his own career path. He himself, emphasized the importance of such dialogue, citing the Buddha, who encouraged people not to accept his teaching on face value, simply out of respect and reverence for him, but to examine it for themselves in much the same way as a goldsmith might test the quality and purity of some gold that he is seeking to purchase. In a similar way, the Dalai Lama stressed, we should examine the words of the Buddha, and if, through reasoning and understanding, we find them to be reliable and convincing, only then should we accept them as valid.

There have been two similar dialogues between the Dalai Lama and the Western scientists. The first of these was the 'Harvard Mind Science Symposium', held on March 24, 1991, which resulted from more than a decade of collaborative research between the Tibetan Buddhist community and Harvard Medical School and the second is the 'Mind and Life' Conference, which has been held biannually since 1987 in the form of a serial dialogue on diverse scientific disciplines between the Dalai Lama and Western scientists.

Dr. Francisco. J. Varela of the Parisian Ecole Polytechnique and Institute of Neuroscience, had encountered the Dalai Lama several times in public meetings in Europe, but had felt frustrated on those occasions because of lack of time to have a fruitful dialogue. When visiting Paris in 1986, the Dalai Lama again invited Dr. Varela to meet for discussion. On this occasion they met for over an hour, during which time the Dalai Lama questioned Dr. Varela in depth about neuroscience. At the end of the hour the Dalai Lama had to leave for another scheduled meeting but as he left he said to Dr. Varela, "We must talk more, but I cannot give much time to such discussion when I am visiting the West so I will make a week of my time available if you can come to Dharamsala bring anyone else you want." This was how the first 'Mind and Life' Conference came about in October 1987.

From 1987 until 1999 the 'Mind and Life' conferences were held biannually and thereafter, annually, until present time. The tenth 'Mind and Life' conference was held at Dharamsala over one week period in October 2002. The theme of the dialogue was "Nature of Matter, Nature of Mind" and was attended by seven scientists, the Dalai Lama and two interpreters. However, the eleventh 'Mind and Life' conference was held for the first time since the inception, as a public meeting in Boston in September, 2003, with the theme "Exchanges between Buddhism and Bio-behavioral Sciences on How the Mind Works."

1. Harvard Mind Science Symposium

In October 1979, Dr. Herbert Benson of Harvard Medical School

met with the Dalai Lama during his first visit to Harvard University. On that occasion, he explained his research concerning experiments on the physiological effects of simple meditative techniques, and requested permission to study several of the advanced meditative techniques of Tibetan Buddhism. Moreover, Dr. Benson hoped to study the remarkable alleged mind/body effects of gTum-mo yoga which was dramatically described in the book *Magic and Mystery of Tibet*, by the author Alexandra David-Neel. The Dalai Lama acceded to his request and several months later the collaborative research between Harvard Medical School and the Tibetan Buddhist community began. The Harvard Mind Science Symposium of March 24, 1991 was convened as a celebration of a decade's work on this research and was held in the presence of the Dalai Lama at the Kresge Auditorium, MIT.

At this symposium, scientists acknowledged that modern psychology had suffered from a myopic historical vision, in its belief that psychological endeavor had only begun around the 19th century and had been based exclusively in Europe and America. At this symposium there was agreement among scientists that the systematic study of the mind and its workings did in fact date back to the historical arising of Buddhism, well before the Christian era, and that this exploration had been at the heart of Buddhist spiritual life. The Dalai Lama stressed that an understanding of the nature of mind is fundamental to Buddhist thought. Tibetan Buddhist teachings include a detailed map of how changes in the mind and body affect each other, as well as a body of techniques for bringing those affects under voluntary control.

A key speaker at the symposium, Dr. Benson, reviewed his pioneering research on mind/body relationship, with special attention to the 'relaxation response', which combines meditative techniques and modern medicine. He also described the findings of his research which had involved observation of advanced Tibetan meditators practicing gTum-mo yoga. The gTum-mo yoga is an advanced Tibetan meditation practice which generates internal heat. Dr. Benson's experiment involved wrapping sheets which were frozen with ice around a practitioner's

naked body and observing how the ice was melted as a result of the internal heat generated by these practitioners. According to Dr. Benson's experiment, when the gTum-mo meditators had wrapped sheets measuring 90×180 cm., which had been dipped in icy water, around their naked bodies while they were practicing in a room with a temperature of 4 °C, the sheet had started to steam within 3 to 5 minutes and had dried completely within 45 minutes. This same experiment was continued twice more the same night, ending just before dawn. When Dr. Benson's team applied modern scientific methods to measure the changes occurring in the body responses of these practitioners during the gTum-mo yoga practice, they found a striking increase in oxygen consumption and a notable increase in temperatures in fingers and toes.

This finding brought the commonly held notions of Western science into question, as Western science had maintained that it was not possible for heat to be generated from the skin in such a cold environment, so Dr. Benson's findings flew in the face of Western science's understanding concerning the heat conservation phenomena of human and other warm blooded animals. When we are placed in a cool or cold environment there are two ways that we can conserve heat; either through non-circulatory or circulatory factors. The non-circulatory factors that decrease heat loss include both the ability of animals to raise their hair to create an extra insulation, and the human response of simply adding extra clothing to conserve heat. The circulatory factors that decrease heat loss, on the other hand, are the body's attempts to conserve heat in the central organs such as heart, lungs and brain, by clamping down the local blood vessels so that less blood is exposed to the skin and less heat is lost. But with this, subsequently, exposed body parts such as fingers, toes and ears may become so cold that frost-bite occurs. In gTum-mo yoga, the heat of the human body is circulated in quite an opposite way to the circulatory factors known to Western science. Thus, it was observed in the gTum-mo yoga participants experiment that meditative processes can lead to rather striking physiological changes in the body. From these findings it was concluded

that changes would have direct health implications, to the extent that a disorder is caused or worsened by stress. Researchers agreed that these very simple processes may be quite appropriate in the treatment of stress-related disorders and confirmed their dedication to endeavoring to better understand how the mind can influence the body.

In addition to lectures on mind, brain, psychology, cognitive science and mental health, presented by the Dalai Lama, Dr. Robert A., F. Thurman (Indo-Tibetan Buddhist Studies, Columbia Univ.), Dr. Howard E. Gardner (Education, Harvard Univ.) and Daniel Goleman (Contributing Writer to the New York Times), also addressed this 1991 symposium. There were two lengthy dialogues between the Dalai Lama and Harvard Medical School scientists, on Buddhism, neurosciences, medical sciences, and cognitive sciences.

The entire proceedings of the symposium were published in 1991, under a separate volume titled, *Mind Science* (Dalai Lama et al., 1991).

2. Science of Mind

The first 'Mind and Life' Conference, which had as its theme 'Science of Mind', was held at the residence of the Dalai Lama in Dharamsala, in October, 1987. Besides the Dalai Lama, there were six scientists from Europe and America, two Tibetan scholars, and two interpreters who participated in intensive meetings for eight hours a day over six days.

The scientists who participated were leading scholars in their fields, including, Francisco J. Varela (Cognitive Science and Epistemology, Paris Ecole Polytechnique), Newcomb Greenleaf (Computer Science, Columbia Univ.), Jeremy W. Hayward (Physics, MIT), Robert B. Livingston, M.D. (Neuroscience, U.C. San Diego), Luigi Luisi (Chemistry, Federal Institute of Zurich), Elinor Rosch (Cognitive Science, U.C. Berkeley).

At this first meeting the atmosphere between participants was always warm, friendly and informal. Yet there was also an underlying energy of keenness and alertness, with everyone being very present and

on the ball, making it an ideal environment for intellectual exploration and deepening understanding. At the final morning session the scientists all expressed deep gratitude to the Dalai Lama for giving so much time from his extremely busy schedule, and they assured him that they were profoundly impressed at his grasp of the issues and his attitude of fearless inquiry.

This first conference raised issues of scientific method and validation, perception and brain, cognitive psychology, artificial intelligence, perception and consciousness, evolution of life, evolution, *karma* and compassion. Records of discussions reveal that participants acknowledged a major consensus between Buddhism and science. The following quotation is taken from one of the dialogues, titled 'What is a Sentient Being?'

"Dalai Lama: Does a one-celled creature like an ameba have the whole range of cognitive events, such as desire, sexual desire, feeling, and so on?

Varela: This is the disputed point. Some amebas can behave as male and female. Sometimes they get together and exchange, not as one male and one female, but nevertheless as sexual partners. They exchange genetic material.

Now let's compare amebas with bacteria. Bacteria are simpler cells. They also have sex. And they have the capacity to seek food and get away from things that are harmful, much like that little ameba. Some people would say, with good reason, that in bacteria you'll find all of those behaviors, including cognitive behavior. Sensory-motor correlations happen inside the cell, all at the one-cell level. But of course a bacterium has no neurons. On this basis it can be said that the nervous system does not invent cognition. It only expands the range of sensory-motor capacity. This is very important.

Dalai Lama: Therefore, would you consider a one-celled creature like an ameba a sentient being?

Varela: Yes. From this point of view, there is no question. There is no way for me to draw a line and distinguish my cognition from the cognition of frogs, hydras, amebas, or bacteria.

Dalai Lama: In your personal view, are bacteria a sentient being? The question is important in the Buddhist context,

because when you take the life of a sentient being, this constitutes wrong deed. If that being has a desire for happiness and does not want suffering, then taking the life of that being constitutes a lot of suffering. So is it wrong to kill an ameba? The Buddhist would say that if the ameba feels pleasure and pain, wishes for happiness and to be free of suffering, then it is wrong to kill it, and otherwise it is not wrong.

Varela: The behavior of the bacterium or ameba is one of avoiding some things and seeking others, much like the behavior of clearly sentient beings, like cats and humans. Hence I have no basis for saying that the behavior is not of the same kind, although I would say there is no consciousness of pain or pleasure. The ameba intrinsically manifests a differentiation between what it likes and what it doesn't like. In that sense, there is sentience. Why do I say that a cat feels pleasure and pain and seeks satisfaction and is a sentient being? There is no way that I can know what the experience of a cat is.

Dalai Lama: Yes, that's right.

Varela: Exactly the same argument applies to the ameba or bacterium. I cannot know what the experience of a bacterium is, but if I observe its behavior, it is of the same kind. This is why, as a scientist, I can say that the behavior of the bacterium is cognitive behavior" (Hayward and Varela, 1992:66-67).

In the latter part of this dialogue, the Dalai Lama asked even more probing questions, such as "If bacteria have the faculty of feeling, then do plants also have this kind of faculty?" And, "On the level of the tiniest particles, atoms and subatomic particles, is there really any fundamental distinction between totally inert or inanimate things like rocks, as opposed to that which goes into flesh?"

In 1992, the proceedings of this conference were published as a separate volume titled, *Gentle Bridges* (Hayward and Varela, 1992).

3. Brain Science and Buddhism

The second 'Mind and Life' conference was convened by neuroscientists and psychiatrists, in dialogue with the Dalai Lama. They

met for two days at Newport Beach Ca., U.S.A. from October 5, 1989. In the early morning of the first day, history intruded unexpectedly into the meeting with a phone call from Oslo announcing that the Dalai Lama was to be awarded the Nobel Prize for Peace. Shortly after this call there were many more calls coming in from mass media networks. But by 7:00am the Dalai Lama made the decision to start the conference at 9:00am as scheduled. When he and all the participants were seated in a circle, Robert Livingston, who was the scientific coordinator, spoke a few warm words of congratulations. The Dalai Lama responded modestly, that the prize should not be considered as recognition of any personal qualities on his part, but was an important recognition of the non-violent path which he followed. Those who met with him that day were struck profoundly by his equanimity, in light of receiving this highest honor of humanity.

All the scientists who participated in this second conference were leaders in their fields, such as Robert Livingston (Neurosciences, U.C. San Diego), Patricia Smith Churchland (Philosophy, U.C. San Diego), Antonio R. Damasio, M.D., (Neurology, Univ. of Iowa), Larry R. Squire (Psychiatry, U.C. San Diego), J. Allan Hopson, M.D., (Psychiatry, Harvard Medical School), and Lewis L. Judd, M.D., (Director, National Institute of Mental Health). In addition to the Dalai Lama there were two interpreters, Dr. Alan Wallace and Dr. Thupten Jinpa, who also participated.

The agenda of this second conference included, natural science of the mind, a middle path between dualism and materialism, spectrum of consciousness, mapping brain functions, subliminal awareness and memories from previous lives, anatomy of memory, control of sleeping and dreaming states, subtle consciousness, psychiatric illness and psychopharmacology. The dialogue around all of these issues was open and unreserved.

The proceedings of this conference were published in 1999, as a separate volume titled *Consciousness at the Crossroads* (Dalai Lama et al., 1999).

4. Mindfulness, Emotions and Health

'Mind and Life III' had the theme 'Mindfulness, Emotions and Health', and was held at the Dalai Lama's residence, Dharamsala, in March, 1991. There were seven American scientists, the Dalai Lama and two interpreters, participating over five days, with intensive, eight hour meetings each day. The participating scientists, all leaders in their fields, were Francisco J. Varela, Daniel Goleman (Contributing Writer to the New York Times), Clifford Saron (Psychology, Albert Einstein Medical School in New York), Richard Davidson (Neuroscience, Univ. of Wisconsin), Daniel Brown (Psychology, Harvard Medical School), Sharon Salzberg (Principal Teacher, Insight Meditation Society), and Jon Kabat-Zinn (Stress Reduction and Relaxation Program, Univ. of Massachusetts Medical Center)

The purpose of this third conference was to facilitate the emergence of new insights into the relationship between health and emotional experience, and to enhance mutual understanding between Eastern and Western cultures. The scientists noted that it had only been in the past twenty years that Western physicians, biologists, and psychologists had begun to comprehend the interrelationship between emotional states and mental and physical well-being. As a result of the dialogue throughout this symposium, the scientists present acknowledged that Buddhist thinkers had been aware of the mind's healing capacity for more than two thousand years.

Some of the questions that were discussed in unreserved dialogue included, 'Can the mind heal the body? How are the brain, immune system, and emotions interconnected? What emotions are associated with enhanced well-being? How does mindfulness function in a medical context? Is there a biological foundation for ethics?' And, 'How can death help us understand the nature of the mind?' As a result of the dialogue around these issues, participating scientists were able to recognize that the Dalai Lama served as a touchstone for their own more recent scientific discoveries.

In 1997, the entire proceedings were published as a separate

volume, titled *Healing Emotions* (Goleman, 1997).

5. Sleeping, Dreaming, and Dying

'Mind and Life IV' was held in October, 1992, at Dharamsala, this time with the theme, 'Sleeping, Dreaming, and Dying'. Nine participants attended this fourth conference, including six American scientists, the Dalai Lama and two interpreters they met each day for 8 hours of intensive discussion over five days. Leading scientists who participated included, Francisco J. Varela, Jerome Engel Jr. M.D. (Neurology, UCLA Medical School), Jane Gackenbach (Psychology, Univ. of Northern Iowa), Joan Halifax (Medical Anthropology/Psychology, Udaya Foundation in New Mexico), Joyce McDougall (Supervising Analyst, Paris Society and the Institute of Psychoanalysis), and Charles Taylor (Philosophy, McGill Univ.).

The major topics of this conference - while addressing essential functions of human existence - are nevertheless elusive to Western understanding, they are: 'Sleeping, dreaming, and dying'. In keeping with the spirit of the conference, the scientists presented broad summaries about their research and what was current in the West in their representative fields. The topics included, 'What is self?', 'The Brain's Sleep', 'Dreams and the Unconscious', 'Lucid Dreaming', 'Levels of Consciousness and Dream Yoga', 'Death and Christianity', 'What is Bodily Death?', 'Near-Death Experience' and others.

The conference proceedings, titled *Sleeping, Dreaming, and Dying*, were published in 1997 (Varela, 1997).

6. Altruism, Ethics, and Compassion

'Mind and Life V', with the theme 'Altruism, Ethics, and Compassion', was again held at Dharamsala, India, in October, 1995. Seven scientists from America, the Dalai Lama and two interpreters, participated for a week of intensive meetings. The scientists were, Richard J. Davidson (Psychology and Psychiatry, Univ. of Wisconsin),

Georges Dreyfus (Religion and Philosophy, Williams College), Nancy Eisenberg (Psychology, Arizona State Univ.), Robert Frank (Economics, Ethics and Public Policy, Cornell Univ.), Anne Harrington (History of Science, Harvard Univ.), Elliott Sober (Philosophy, Univ. of Wisconsin), and Ervin Staub (Psychology, Univ. of Massachusetts).

This conference was about ‘Compassion’. What is compassion? Where does it ‘fit’ into our understanding of human nature? And, what could it mean for science in particular, if we were to learn more about it? There was discussion about what might happen if Western bio-behavioral science was to allow its thinking to be challenged by the interrogating voice of a fundamentally different cultural perspective: that is, Tibetan Buddhism. The scientists agreed that the dominant note of Western behavioral sciences had been ‘tragic machismo’, based on ancestor origins in “killer apes”, which had caused them to ponder the potential for violence and explore the genetic and biochemical bases of their capacity for selfishness, depression, and anxiety. In contrast, Tibetan Buddhism has long celebrated the human potential for compassion, and is dedicated to studying the scope, expression, and training of compassionate feeling and action and even more fundamentally, spiritual transformation. So how did these differences in thinking happen? And, given the participants’ understanding of the points of difference and overlap, what could they expect to learn from each other through dialogue? These were main themes of the meeting. The major topics included, ‘Science of Compassion’, ‘Is Compassion an Emotion?’, ‘Kindness and Cruelty in Evolution’, ‘Our Fundamental Nature’. and ‘Altruism in Competitive Environments’. The following, is a quotation from a dialogue on the theme, ‘Why Have the Bio-behavioral Sciences Neglected Compassion?’

“Anne Harrington: We talk about the similarities between Buddhists and scientists, both wishing to know reality objectively. Yet I am struck by the fact that, historically, the more deeply our sciences have probed reality, the less relevant concepts like ‘compassion’ have become.

Dalai Lama: I wonder whether the mainstream understanding that has emerged through the scientific approach, of human

nature as aggressive, selfish, and heartless, will be the final standpoint of science. ... In particular, I feel that science has not yet paid enough attention to the internal world of consciousness compared to the external.

Elliot Sober: It is important to bear in mind that psychology as a science is a hundred years old in the West. One hundred years ago, philosophy and psychology were not separate disciplines. Psychology became an experimental, empirical subject only very recently. ... And for about thirty years of the hundred-year period, the reigning ideology in psychology was behaviorism, which avoided thinking about the mind. You would describe environmental circumstances and behavior, but never think about mental activity. So we are right at the initial birth of serious scientific inquiry into the nature of the mind. It's not over; it's barely begun.

Dalai Lama: My understanding of Western psychology is that it seems to be quite action-oriented. It looks at how psychological states manifest in behavior, such as aggression or violence. ... And the fact is, when you look at behavioral expressions of strong emotions like anger and hostility, they are so striking. The resulting behavior is so noticeable, whereas the (behavioral) manifestations of compassion may not be striking.

Ervin Staub: Another way of making this point, perhaps, is to say that violence is a negative force that impacts you. It's an act of commission. Whereas, when somebody acts altruistically, it's often an act of omission, simply the absence of something. People are very much impacted by the presence of a force, but they don't respond to the absence of something" (Davidson and Harrington, 2002:82-83).

A separate volume titled, *Visions of Compassion* was published in 2002 and contains conference proceedings (Davidson and Harrington, 2002).

7. New Physics and Cosmology

The 'Mind and Life VI' conference, with the theme of 'New Physics and Cosmology', also convened at Dharamsala, in October, 1997. Five scientists from Europe and America, the Dalai Lama, and two interpreters, met for five days. The scientists were David Ritz

Funkelstein (Physics, Georgia Institute of Technology), George Greenstein (Astronomy, Amherst College), Piet Hut (Astrophysics, Institute for Advanced Studies in Princeton), Tu Weiming (Director, Harvard-Yenching Institute), Arthur Zajonc (Physics, Amherst College) and Anton Zeilinger (Physics, Univ. of Innsbruck in Austria). At this conference, one of the interpreters, Dr. Alan Wallace, was introduced as the author of the book, *Choosing Reality*, (mentioned earlier in this article), and he participated in dialogues from time to time as a physicist.

The following is an excerpt from the Dalai Lama's address in the opening session and is published in a separate volume titled *The New Physics and Cosmology*:

“In Buddhism in general, and particularly in *Mahāyāna* Buddhism, the basic attitude is that you should remain skeptical at the beginning. Even the Buddha's own words say that it is better to remain skeptical. This skeptical attitude automatically brings up questions. Questions bring clearer answers, or investigation. Therefore, *Mahāyāna* Buddhist thinking relies more on investigation than on faith. I feel that this attitude is very, very helpful in communicating with scientists” (Zajonc, 2004:6).

The coordinator for the participating scientist representatives spoke thus in his address:

“By bringing together the greatest accomplishments of Western science with the most skillful thinking and philosophical insights from Tibet, we had hoped to shed some light on the thorny issues of modern physics that have so far eluded our understanding. We did not expect final solutions, but rather sought fresh approaches to old problems.”

If someone had a question about whether there is a sound intellectual basis for scientists to dialogue with a religious leader, I think these two excerpts can offer significant insight to this question. The statements of these two leaders have profound meaning for both

Buddhists and scientists. As the Dalai Lama had attended similar conferences on the physical sciences since the inception of 'Mind and Life' conferences in October 1987, he was able to fully participate in the dialogue, even with regard to detailed scientific considerations and intricate problems.

The topics discussed at this fifth conference included, 'Experiment and Paradox in Quantum Physics', 'Philosophical Reflections on Quantum Realities', 'Space, Time, and the Quantum', 'Buddhist Views on Space and Time', 'Quantum Logic Meets Buddhist Logic', 'Scientific Knowledge and Human Experience', 'New Images of the Universe', 'Origins of the Universe and Buddhist Causality', and 'Science in Search of a World View'. There was a great deal of stimulating discussion and the following excerpt is taken from one of these discussions, about the universe.

"Dalai Lama: You develop more and more powerful telescopes, so you can see however many billions of light years. You are seeing galaxies out there that are 15 billion light years away, isn't that right? You see more and more and more. If you were able to see that there are no more galaxies after a certain point, that would imply a finiteness to the universe, however big. If that were the case, the Buddhists would have a problem. Buddhism asserts a literally limitless universe. When Buddhists speak of an oscillating cosmogony, of something comparable to a big bang, a development, a big collapse, a return into empty space, then the whole cycle repeating again, this does not refer to the universe as a whole. It does not refer to everything but rather to a world system. Perhaps a comparable notion would be a galaxy or perhaps a galaxy cluster, but only one certain area of the universe. So, even as one world system is dissolving, somewhere on the other side of the universe another world system is emerging at the same time. This continues infinitely, with no synchronicity among them.

George Greenstein: Continuous creation. That's star formation. That does happen. We can see it happening: Stars form and explode, not synchronized with each other, just as you described.

Dalai Lama: I mentioned galaxies rather than a star or solar

system because the term used in Buddhism means a thousand, thousand, thousand-fold world, or a billion-fold world system. A world system is one with a sun, so a reasonable interpretation would be a billion solar systems, some comparable to a galaxy. In a billion-fold world system, the billion systems within it arise together. Generally speaking, they arise together, develop together, and dissolve together, though not with exact synchronicity. In the esoteric Buddhism of *Vajrayana*, they speak not only of the billion-fold world systems, but of clusters of them - a billion, billion-fold worlds, and then billions of those. So, in Buddhism, you have not only galaxies but also galaxy clusters and mega-galaxy clusters.

George Greenstein: And they themselves are in this endless process of evolution? There is no overall beginning?

Dalai Lama: Exactly.

Anton Zeilinger: Where does one of these billion-fold world systems emerge from?

Dalai Lama: Space particles.

George Greenstein: So it's not the universe that comes out of space particles, but the galaxies.

Dalai Lama: Space particles can also be seen as the remnants of previous galactic systems. When Buddhists use the term universe, they are not referring to any particular galaxy system but to the infinite totality.

...

Anton Zeilinger: Your Holiness, when we talked about thousands of thousands world systems, Alan mentioned that what you count are living world systems. Is that right? Do Buddhists believe that there really are living systems out there?

Dalai Lama: Oh, yes.

Anton Zeilinger: And there are many, many of them?

Alan Wallace: When they speak of a billion-fold world system, they don't count world systems that are uninhabited by sentient life forms. Only those that have sentient beings are even counted" (Zajonc, 2004:95-98).

The proceedings of the conference were published as a separate volume titled *The New Physics and Cosmology* in 2004.

8. 'Mind and Life' Conferences VII and VIII

At the conclusion of the sixth 'Mind and Life' conference, Austrian physicist, Anton Zeilinger, spoke appreciatively of the Dalai Lama as a genuine scientific collaborator, and invited him to visit his Innsbruck laboratory. During June 1998, Dr. Zeilinger, Dr. Arthur Zajonc, the Dalai Lama, and two interpreters were gathered there at Dr. Zeilinger's laboratory in the Institute for Experimental Physics in Innsbruck, and 'Mind and Life VII' was convened at that location for three days. At that time Dr. Zeilinger was able to demonstrate his actual experiments to the Dalai Lama, and was supported by him to obtain startling conclusions about quantum theory, while continuing to probe the foundations of quantum mechanics. The meeting was the subject of a cover story in the January 1999 issue of the German publication of *Geo* magazine and it is expected that the Innsbruck dialogues will soon be published.

The eighth 'Mind and Life' conference with the theme, 'Destructive Emotions', was held in March, 2000, back at the Dalai Lama's residence in Dharamsala. On this occasion there were nine scientists from Europe and America, the Dalai Lama and two interpreters, who met for a week. The proceedings of this conference were published as a separate volume titled *Destructive Emotions* in 2003 (Daniel Goleman, 2003).

IV. Conclusion

Up to this point I have introduced in a brief form, the pathway of major contacts and consensus between Buddhism and science, and I have also reviewed the main points arising from the ongoing cross-cultural dialogue between Tibetan Buddhism and Western scientists, with the Dalai Lama as the leading Tibetan Buddhist representative. I think that scientific commentary on Buddhist tenets and Buddhist commentary on scientific principles, and direct dialogue between Buddhist scholars and modern scientists, are both equally significant for achieving cross-cultural consensus however, it seems that the latter, that is, direct dialogue, has had more expansive impact on Western society. In the course of 'Mind and Life VI' discussions, the

Dalai Lama spoke about the meditative experience of space and time, as follows:

“There are two different perspectives in the Buddhist discussion of time and space. The one I have just described is presented in the Buddhist texts as a purely objective theory about the nature of the physical universe-objective in the sense that it need not be experienced in a meditative state but is simply what's there.

There are also modes of experience or phenomena that emerge through the power of a contemplative's own transformed mind, and they don't exist without that. If you empower your mind by various contemplative practices, a certain realm of reality arises through the maturation of your contemplative insight” (Zajonc, 2004:91-92).

In this passage, the Dalai Lama is suggesting that there are views which can only be attained through contemplative insight. Moreover, he encourages the participating scientists to empower their mind by adopting some meditative practice, so as to achieve maturation of their contemplative insight. This would certainly seem a useful suggestion as, if scientists were to practice some form of effective meditation and thus attain a certain realm of reality, they would be able to achieve superlative results in their research in the future.

Abbreviation

T *Taishyō-shinsy-daizōkyō* (大正新修大藏經; Japanese Edition of Chinese *Tripitaka*). Tokyo: Taishō-Issaikyō-Kankōkai.

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