

Buddhism and Science : Some Reflections

Ven. Chuan Sheng
Buddhist College of Singapore

Abstract

The encounters between Buddhism and science have come a long way since the times of Taixu, encompassing what Taixu perceived to be physical sciences based on the six senses and the scientific study of thought processes. Whether they can develop into the more profound science of direct intuitive acquaintance or enlightenment, or demonstrate that the six pāramitās are in accordance with scientific research, are interesting issues that can be further pursued. This essay has started with a brief historical account from the Scientific Revolution to the “Mindful Revolution,” followed by an overview of how the encounters have been interpreted and categorized. It has also highlighted recent scientific advances that have a bearing on Buddhism in the fields of the biological and physical sciences, and neuroscience and psychotherapy, as well as the many positive ways in which the studies of Buddhism and science have interacted and can proceed. We can certainly look forward to such encouraging trends, to learning from such fascinating encounters of Buddhism and science.

Keywords: Buddhism, Science, Some Reflections

Introduction

In general, what is a gain to science is a loss to religion... But Buddhism benefits by the discoveries of science. The more science progresses, the clearer Buddhism becomes, for Buddhism explains the truth concerning the universe... Science helps us to understand Buddhism by offering suitable analogies.

So commented Venerable Master Taixu 太虛 (1897-1947) in 1933 (Pittman, Don A, 2001 : 167) A prominent Chinese Buddhist reformer whose legacy is seen in the practices of modern Chinese Buddhism today, Taixu regarded Buddhism as “the only religion which does not contradict science,” and considered this as one of the three aspects that characterized his “Buddhism for human life” (*RenshengFoJiao* 人生佛教) (Pittman, Don A. 2001 : 165 - 169).

Taixu’s view captured one facet of the so-called “compatible” relationship between Buddhism and science in the early twentieth century, a compatibility that emerged in the nineteenth century and seen to continue to present times. Throughout this period, Buddhism has been associated with such science as “the mechanistic universe, the theory of evolution, the theory of relativity, the Big Bang, ...

the microscope, the telescope, the spectrometer, and now the MRI..." (Lopez, 2012 : 14). From classical physics, quantum physics and cosmology to Darwinian and neo-Darwinian theories of evolution, recent discussion on the compatibility between Buddhism and science has moved on to focus on the various types of meditation, especially mindfulness, and their relations to neuroscience and psychotherapy, so much so that the 3 February 2014 issue of *Time* magazine had "The Mindful Revolution" as its cover story.

This essay will offer some reflections on the encounters between Buddhism and science. It will raise the following questions: How did the encounters between Buddhism and science begin? How have such encounters been interpreted and categorized? What are some recent scientific advances that have a bearing on Buddhism? How can the interaction between Buddhism and science further proceed? What can this inform us about Buddhist spiritual practice? Through such a discussion, it is hoped that we will have an understanding of some major developments in the field of Buddhism and science, and the role of Buddhist spiritual practice.

To provide the background context, this essay will begin with a brief historical account on the encounters between Buddhism and science from the Scientific Revolution to the "Mindful Revolution", followed by an overview of how the encounters have been interpreted and categorized. It will then highlight recent scientific advances that have a bearing on Buddhism in the fields of the biological and physical sciences, neuroscience and psychotherapy, and briefly discuss how the interaction between Buddhism and science can further proceed. It will conclude with some thoughts on what we can learn from this field.

From the Scientific Revolution to the "Mindful Revolution"

The encounters between Buddhism and science can be traced to the sixteenth century, amid the politics and strife of Western imperialism and colonialism. Originating about 2,500 years ago, Buddhism had first spread from India to the rest of Asia, where it became a major religion in many countries in South Asia, East Asia, and Southeast Asia. Although references to Buddhism had also been made in the West in early times, its presence there had been insignificant. With the onset of the Age of Exploration and the Scientific Revolution from the sixteenth century onwards, encounters between religion and science gradually developed. As Christian missionaries travelled around the world, they allied themselves with science and presented Christianity as the modern religion of advanced Western civilization, superior to other religions; Buddhism was deemed idolatrous, superstitious, ritualistic, pessimistic, and nihilistic (Lopez, 2012 : 10-11).

With the scientific mode of inquiry rising in prominence, empiricism and rationalism were increasingly emphasized in intellectual pursuits. Aided by the science of philology, Western orientalist scholars started mining Buddhist texts, in particular, the Pali Canon (Lopez, 2012 : 38-41). This, together with the prevailing "Victorian crisis of faith" that resulted from the

dominance of scientific modes of thought, wariness toward heightened evangelism, and openness to religious pluralism, provided the contexts for the emerging discourse of “scientific Buddhism” (McMahan 2008, 89-113). From the 1860s Buddhism and science came to be seen as compatible, leading one intellectual, Paul Carus, in 1896, to portray the Buddha as “the first positivist, the first humanitarian, and the first prophet of the Religion of Science.” Buddhist leaders from the late nineteenth to early twentieth centuries took note, and stressed this compatibility in their anti-imperialist struggles and efforts to revitalize Buddhism (Lopez 2012, 7-11).

The close association between Buddhism and science has continued since then, leading Lopez to term this phenomenon as the “Scientific Buddha,” “a Buddha to whom all manner of scientific insights would be ascribed, from the mechanisms of the universe to the structure of the atom, from a natural law of morality to the deepest workings of the mind” (Lopez, 2012 : 41). The stress on Theravāda traditions in the late nineteenth and early twentieth centuries expanded to encompass Mahāyāna discourses, especially Zen, in the latter half of the twentieth century, and Vajrayāna thought in recent decades due to the prominent role played by the Dalai Lama (Lopez, 2008 : 25-35). This close association is evident in the numerous books written on the subject throughout this period. They include works by scholars of different Buddhist traditions and scientific expertise, such as Wang Chi Biu (1946), Egerton C. Baptist (1955), K. N. Jayatilleke, Robert F. Spencer, and Wu Shu (1958), D. T. Suzuki, Erich Fromm, and Richard De Martino (1960), Fritjof Capra (1975), W. R. Kloetzli (1983), Buddhadasa P. Kirthisinghe (1984), P. A. Payutto (1995), B. Alan Wallace (1996), James H. Austin (1998), J. K. P. Ariyaratne (2001), the Dalai Lama (2005), Chi-Sing Lam (2008), Rick Hanson (2009), Phra Dharmakosajarn (2010), and RatmalaneSomaloka (2012).

B. Alan Wallace notes that such scholars as ThuptenJinpa and José Ignacio Cabezón have analyzed Buddhism-science encounters and categorized them in three main ways. First, Jinpa’s notion of “rival philosophy” and Cabezón’s concept of “conflict/ambivalence” stress the perception of science as a field of knowledge that differs fundamentally from Buddhism. Such a view corresponds to scholars who see religion and science as “autonomous (nonoverlappingmagisteria)” realms of knowledge that hold little promise for mutual conversations; Wallace highlights that post-modernist scholars have likewise considered Buddhism and science to be “fundamentally incomparable” since they interpret these two disciplines to be “culturally specific” (Wallace, 2003 : 1-4, 20-25, 69; Jinpa, 2003 : 79-80; Cabezón, 2003 : 41-43).

Second, in Jinpa’s characterization of “ally philosophy” and Cabezón’s categorization of “compatibility/identity,” Buddhism and science are seen to have important similarities, leading advocates to cite scientific data to buttress Buddhism, to claim that Buddhism and science are identical, or to see Buddhism as a higher form of knowledge (Wallace, 2003 : 69; Jinpa, 2003 : 80; Cabezón 2003, 43-48).

Third, in Jinpa's interpretation of "equal partner" and Cabezón's understanding of "complementarity," a constructive engagement of Buddhism and science that can expand the frontiers of human knowledge is emphasized; here, the similarities and differences in methodologies and concerns of the two disciplines are seen to be mutually enriching. For instance, Cabezón sees Buddhism and science as "complete systems that resist dichotomizing: systems that can both support and challenge each other at a variety of different levels...." For Jinpa, Buddhism is an appropriate partner of science because of "[Buddhism's] suspicion of any absolutes, its insistence on belief based on understanding, its empiricist philosophical orientation, its minute analysis of the nature of mind and its various modalities, and its overwhelming emphasis on knowledge gained through personal experience." Wallace considers the Buddhism-science discourse a worthwhile "cross-cultural and interdisciplinary pursuit of understanding" since it can "shed a fresh light on our own subjectivity, our own language, and our own categories, for example, of religion, science, and philosophy" (Wallace, 2003 : 27, 69-70; Jinpa 2003, 81-83; Cabezón 2003, 49-61).

Further Exploring the Encounters between Buddhism and Science

Such a cross-cultural and interdisciplinary pursuit of understanding between Buddhism and science can be seen in the fields of the biological and physical sciences, and neuroscience and psychotherapy.

In the biological sciences, the discussion on compatibility was first seen in Charles Darwin's theory of evolution and natural selection and the Buddhist doctrines of karma and rebirth, evident in the arguments of Thomas W. Rhys Davids, Thomas Huxley, Walter Evans-Wentz, and SōenShaku. Nonetheless, Lopez has argued that there seems to be more differences than similarities between Darwinism and karma and rebirth when examining their interpretations of suffering and happiness, random mutations, sentience and non-sentience, beginning of consciousness or life, perpetuation of different species, and extinction (Lopez, 2012 : 47-80; Lopez, 2008 : 21-22; McMahan, 2008 : 64; the Dalai Lama, 2005 : 97-115).

In recent times, such scholars as Denis Noble, David Brasah, Ratnaprabha, and William S. Waldron have pointed to compatibility in other aspects. Noble (2015) has offered a systems biological interpretation of the concept of No-Self (*anātman*). Instead of stressing the "selfish" nature of genes and molecular biological components, Noble argues that genes do interact with each other and the environment; instead of a one-way "reductionist causal chain" from "the genes to the organism," he emphasizes a "downward causation" of "systems with multiple levels and feedbacks downward and upward between the levels." Noble sees the self as a construct and process, not "an immaterial substance" or the brain; he notes how similar his interpretation is with the "seed-and-fruit" "four-cornered logic" that the

Korean monk, Won Hyo 元曉 (원효) (617-686), used to clarify the Buddhist understanding of “being/non-being.”

Noble’s systems approach resonates with recent trends in the biological sciences. In *Buddhist Biology: Ancient Eastern Wisdom Meets Modern Western Science* (2014), David P. Brasah likens the disciplines of Buddhism and biology to “a pair of powerful searchlights” in providing insights to the issues of life, and calls his interpretation “Existential Bio-Buddhism.” Inspired by Vietnamese Zen Master Thích Nhất Hạnh who uses the term “interbeing” to refer to the interdependence of all beings, an idea related to the “interpenetration” emphasized in Chinese Huayan Buddhism, Brasah stresses interconnectedness, together with “not-self” and impermanence, in his discussions on evolution, genetics, ecology, and neuroscience (Brasah, 2014 : Ratnaprabhan.d.).

Likewise, William S. Waldron (2015a) has suggested how terms like river, tree, frog, and human can be used to illustrate such Buddhist concepts as dependent arising and non-self. In another essay, like Noble’s downward causation, Waldron views human evolution as “a self-organizing, feedback process” that conditions and results in constantly changing forms and patterns, behaviors and experience, and structures and developments; Waldron uses this “Middle Path” that goes beyond “absolute determinism and absolute autonomy” to transcend the sterile nature-versus-nurture debate that has long featured in evolutionary biology (Waldron, 2000 : 3).

Ratnaprabha supports the position of Noble and Waldron, highlighting how genes operate in complex manners in varying circumstances and how “survival-enhancing features innovated by a parent can pass to its descendants without changes to the genetic sequence,” in processes termed epigenetics (Ratnaprabhan.d.). The propositions of Noble, Brasah, Waldron and Ratnaprabha are similar in some ways to such recent theoretical paradigms as complexity theory and systems theory which stress an integrated and networked approach in understanding our “biological, psychological, social, and ecological systems” (McMahan, 2008 : 170).

Ratnaprabha further argues that the minds of animals and human beings can be understood to have evolved through “law-governed causal sequences.” Analyses are given in his Dharma Training Course module, “Evolutionary Buddhism” (2009), and in his book, Robin Cooper (Ratnaprabha), *The Evolving Mind: Buddhism, Biology and Consciousness* (1996), which discusses how consciousness evolves “from the simplest organism, through the self-aware human being, to enlightenment,” through a process of “perpetual self-transcendence.” Likewise, Waldron considers the Buddhist doctrine of karma to be similar to evolutionary biology in that the present constitution of human life, its forms and structures, is the product of the activities of past immeasurable generations of beings (Waldron 2000, 7). This is further seen in how a living organism is understood to be a constantly

changing “organization of matter and energy” that transcends absolute identity and absolute difference (Waldron, 2000 : 19-20). Ratnaprabha and Waldron therefore provide additional perspectives on the Darwinism-karma debate.

Ratnaprabha and Waldron also highlight the need to go beyond scientific materialism, which privileges matter as the “one real substance that made up everything in the universe,” and the mind as “nothing but patterns of electrical and chemical processes in the brain” (Ratnaprabha.d.). Building upon the work of such scholars as Humberto Maturana and Francisco Varela, John Tooby and Leda Cosmides, and Fritjof Capra, Waldron concludes that “our minds and selves are not simply *analogous* to but are *fundamentally inseparable* from the natural world... The Buddhist parallels to this biological ‘Mind-Only’ theory, *mutatis mutandis*, are legion” (Waldron, 2000 : 20-22).

By highlighting how evolutionary biology and Buddhism can lead us to understand an interdependence that pervades all phenomena, doing away with the dualities of mind and matter, Waldron and Ratnaprabha show us how the discussion on Buddhism and science can be further explored.

In the physical sciences, the Buddhism and science discussion on compatibility was first seen in the observer-independent materialist/realist/essentialist interpretation of matter that views real atomic matter particles constituting the physical world. This was followed by the objective idealist interpretation that sees objective reality as “a subjective apparition or illusion of a sober, sentient perceiving consciousness,” and the centrist Middle Way interpretation of “objective relative and subjective ultimate” (Boaz 2015d and 2015a) that stresses the concept of “two truths” and “emptiness.” Such a spectrum of views are reflected in the works of Ankur Barua, Shuichi Yamamoto and Victor F. Kuwahara, B. Alan Wallace and David Peter Boaz, with Wallace and Boaz advocating a noetic revolution.

A critique of the materialist approach, and arguments for the scientific credibility of the “double truth” Middle Way approach, are further presented in Graham P. Smetham’s 2011 essay, in which he makes four interesting arguments. First, using the analogy made by Henry P. Stapp, Smetham explains that modern quantum theory maintains two levels of reality: quantum reality is “idealike” or “mindlike,” an evolving “pool of potentiality for experiential existence” that allows the *apparent* reality of the material world to emerge when sentient beings “cognitively interact” with it (Smetham, 2011: 5). Such an interpretation parallels the Buddhist two truths or two realities, as understood in the Cittamātra (Mind-Only) and Madhyamaka (Middle Way) structure of reality: ultimate reality and the illusion of the conventional reality of the everyday world. Because quantum physics has directed attention to the illusory reality of the material world, Victor Mansfield considers modern quantum physics as “experimental metaphysics” (Smetham, 2011 : 11-12).

Second, Smetham draws parallels between the Buddhist concept of “emptiness” and the notion of “quantum potentiality.” He begins by noting the “paradoxical existential configuration of the state of the *Tathāgata* [Buddha] after death,” as presented in the *Samyutta Nikāya* (SN 22.86 - Anurādha Sutta): “The

Tathāgata exists after death, does not exist after death, both does & does not exist after death, neither exists nor does not exist after death.” Smetham then shows how the “tetralemma” of Madhyamaka Buddhism that explicates “emptiness” (*shunyata*) or ultimate reality contains this configuration: “Neither existent, nor nonexistent, Nor both existent and nonexistent, nor neither.” He further notes that this configuration matches J. Robert Oppenheimer’s analysis of an electron (a quantum “particle”) and hence the ground of quantum potentiality: “If we ask, for instance, whether the position of the electron remains the same, we must say ‘no;’ if we ask whether the electron’s position changes with time, we must say ‘no;’ if we ask whether the electron is at rest, we must say ‘no;’ if we ask whether it is in motion, we must say ‘no.’ ” (Smetham, 2011 : 7).

Third, Smetham highlights similarities between the Buddhist concept of “emptiness” and the notion of “quantum weirdness” in explaining the working of the universe. Madhyamaka Buddhism characterizes “emptiness” as “a hovering between existence and non-existence,” and sees it as necessary for all phenomena to function and for the world of experience to arise (Smetham 2011, 8). Marcus Chown posits the same function to this hovering and calls it “quantum weirdness”; Smetham explains it as the “ability of a quantum particle to be in two places at the same time, whilst still maintaining an identity as a single entity.” Michio Kaku has similarly argued that the stability of molecules and the universe is possible because “electrons can exist in parallel states hovering between existence and non-existence.” All these lead Smetham to assert that “quantum physics supports the Buddhist ‘two truths’ metaphysics, with ‘emptiness’ – the lack of inherent existence which ‘hovers’ between existence and non-existence – as the ultimate truth, in a remarkable fashion” (Smetham, 2011 : 22).

Fourth, Smetham draws parallels between the Buddhist concept of karma and the notion of “consciousness-observer.” He begins by stressing the observer (consciousness)-dependent nature of the conventional world, as presented in both Buddhist thought and modern quantum theory, and proceeds to explain the “quantum measurement problem”: because the particles of the conventional world can be perceived only when measured by human consciousness, they are the expression of how consciousness interact with the ground of quantum potentiality. In other words, it is this “continuous measuring activity of consciousness” that gives rise to the illusory material world from the quantum ground of potentiality, and this conventional world is a collective illusion karmically created “over vast time scales through the perceptual activities of all sentient beings.” Smetham reiterates John Wheeler’s observation that: “The universe does not ‘exist, out there,’ independent of all acts of observation. Instead, it is in some strange sense a participatory universe,” a “self-perceiving universe” (Smetham, 2011 : 17-20).

As such, Smetham concludes that “karma and rebirth is *entirely coherent* with what we know about the deepest level of the functioning of

reality... the preeminence of the karmic mechanism of cause and effect operating at the quantum level....” (Smetham, 2011 : 4).

Hence, in the physical sciences, the discussion on Buddhism and science also highlights the need to further explore all phenomena beyond a scientific materialist perspective, to transcend all dualities in order to comprehend the nature of phenomena.

In the cognitive sciences or sciences of the mind, the Buddhism and science discussion on compatibility was first displayed in the interest in meditation. In the nineteenth and early twentieth centuries, Buddhist meditation found a place in Western society, in the midst of such spiritual currents as transcendentalism and Theosophy. It also fitted well with the “subjective turn” of modernity, as this aspect of modernity stresses “interior life,” personal experience and individualism, instead of “external authority” and institutions. As the pace of modernization and industrialization quickened, meditation came to be seen too as a way to relieve the pressure of hectic lives (McMahan, 2008: 187-188). Mindfulness practice, which emphasizes constant awareness of bodily actions, feelings, thoughts, states of mind, and all aspects of life, also spread widely in these contexts to become the “mindful revolution.” David L. McMahan further attributes the popularity of mindfulness practice to its attunement to “modernity’s broad world-affirming attitude,” to the trend of “modern literature’s valorization of the details of everyday life,” and to the “modern way of resacralizing the world without resort to the supernatural”

Scientific investigation of meditation, which started in the 1960s with Japanese scientific research on Zen meditators, aims to track and understand how meditation affects bodily and mind functions. In recent decades, scientists from many countries have used a plethora of advanced technology to measure and evaluate how meditation and mindfulness practice affect “attention, perceptual sensitivity, anxiety, regulation of emotional states, neurophysiological responses to stressful stimuli, immune system functioning, central nervous system activity, and specific neurological structures,” and how they can work to alleviate stress, manage pain, provide psychotherapy for mental ailments, assist recovery from illnesses, and bring about well-being and happiness (McMahan, 2008 : 204-205; Baer 2006). Recent discussions on neuroscientific evidence that support the health benefits of the various types of meditation are given in the works of Piya Tan (2015b) and Rick Hanson. How mindfulness practice has been used in psychotherapy and maintenance of well-being is reflected in the essays of Gregor Lange, RatmalaneSomaloka (2015), LobsangRapgay, Piya Tan (2015a), and Wee Sin Tho. Lange (2015), for example, has presented an overview of the multitude of mindfulness-based interventions, such as Mindfulness-Based Stress Reduction (MBSR), Dialectical Behavior Therapy (DBT), Mindfulness-Based Cognitive Therapy (MBCT), Acceptance and Commitment Therapy (ACT), Mindfulness-Based

Relapse Prevention (MBRP), Mindfulness-Based Eating Awareness Training (MB-EAT), Mindfulness-Based Childbirth and Parenting (MBCP), and Mindfulness-Based Mind Fitness Training (MMFT).

Besides being an object of scientific investigation, meditation has also been perceived to be a type of science. This proposition could be traced to the spiritual environments of Western society in the nineteenth century, which regarded meditation and contemplative aspects of religions as an “interior science” on par with empirical science. It developed further in the twentieth century, with some scholars considering Buddhist meditation to be an “inner science,” a “science of mind,” or “radical empiricism”; Wallace, for instance, has discussed Buddhist radical empiricism in terms of Vaibashika’s dualistic reductionism, Sautrāntika’s pluralistic realism, Yogachara’s philosophical idealism, and Madhyamaka’s ontological relativism (McMahan 2008, 205-208; Wallace, 2012 : 62, 125-143).

Wallace and Boaz have also argued for the need of the cognitive sciences to now move toward a noetic revolution, by integrating hard cognitive sciences with soft contemplative science. Wallace (2015b) contends that the coming together of the experiential inquiry of Buddhism and the rational inquiry of science will lead to a noetic revolution that can benefit humanity immensely. Boaz (2015c) observes how this “noetic (subject/object unity)” perspective and the Buddhist concepts of two truths and emptiness can clarify “the ontological interdependence—the prior unity—of all arising phenomena,” and give rise to the understanding that there is “no intrinsic duality of knowing subject and appearing objects,” that “Mind and body, spirit and matter are an unbounded unified nondual whole (*mahabindu*)” (see also Wallace 2000; Boaz 2015b). Yet, why is it so important to understand the nature of consciousness? (Wallace, 2012 : 157) explains:

Because a world that truly understands the nature of consciousness becomes reoriented away from the hedonic treadmill of consumerism and toward the infinitely renewable source of happiness, cultivated by training the mind. People who truly understand the nature of consciousness may find themselves upholding ethics that are universal and empirically verifiable. In a civilization that truly understands the nature of consciousness, the world’s great religions may discover their contemplative roots and reclaim their deep common ground.

In what other ways can the encounters between Buddhism and science be further explored? In his article, “Buddhist Modernity and the Sciences,” Waldron (2015b) has suggested how Buddhism, through the examples of causality and non-essentialism, and self-identity and suffering, can work with the sciences to contribute to the modern world. McMahan, in seeing scientific Buddhism as one facet of how Buddhism has adapted and hybridized in modern times through the processes of “detraditionalization, demythologization, and psychologization,” negotiating between “the rationalist imperative to avoid supernaturalism and the Romantic longing for

the reenchantment of the world,” has proposed several roles that Buddhist modernism can play in addressing the challenges of contemporary times

The Buddhist analysis of the relationship between craving (*trṣṇa*) and dissatisfaction (*dukkha*), for example, as well as its ascetic tendencies, can be fashioned into a formidable critique of the very foundations of consumerism, materialism, and the pathological aspects of capitalism... Buddhism’s sophisticated techniques of meditation combined with its vigorous ethical reflection offer forms of psychological and spiritual self-cultivation that can transcend the self-absorption and social irrelevance that has beset some modern psychotherapies and New Age spiritualities... Engaged Buddhism, furthermore, brings a unique perspective and a new vocabulary to the discourse of human rights, war and peace, environmentalism, and other pressing social and political concerns, expanding their conceptual resources.

In a similar vein, Venerable Bhikkhu Bodhi (2015b) expresses the hope that: Buddhist thinkers and open-minded scientists, by sharing their insights and reflections, can show us an effective way to heal the rift between objective knowledge and spiritual wisdom and thus bring about a reconciliation between science and spirituality. In this way spiritual practice will become an integral part of the discipline aimed at knowledge, and spiritual practice and knowledge in combination will become the tools for achieving the highest good, enlightenment and spiritual freedom.

Some Final Thoughts on Buddhism and Science

The scientific method should operate on different levels. There are, first, the so-called physical sciences based on the six senses. Then there is the scientific study of thought processes. Beyond this there is the more profound science of direct intuitive acquaintance or enlightenment known only to a few choice souls who have seen through the nature of existence and have come to a consciousness of reality beyond all the illusions and distractions of life. This experience is attained by means of quiet abstraction and intuitive response to the universe. The Buddhist Hall of Meditation is the laboratory for this more advanced type of scientific research. And the materials for the experiment are none other than one’s own bodily senses and his mind...

So wrote Frank Millican in 1926 of Taixu’s view on how science can become “more comprehensive” to better demonstrate the “harmony” between Buddhism and science (Pittman, 2001 : 168-169) Taixu had likewise commented on another occasion: “If life, however, were founded on the six pāramitās—the six perfect virtues of the bodhisattvas—and these were realized to be in accordance with scientific research, then we might hope to enter into the pure realms of Buddha and emerge from the chaos of fire and brimstone into which we have fallen” (Pittman, 2001 : 166).

The encounters between Buddhism and science have come a long way since the times of Taixu, encompassing what Taixu perceived to be physical sciences based on the six senses and the scientific study of thought processes. Whether they can

develop into the more profound science of direct intuitive acquaintance or enlightenment, or demonstrate that the six pāramitās are in accordance with scientific research, are interesting issues that can be further pursued.

This essay has started with a brief historical account from the Scientific Revolution to the “Mindful Revolution,” followed by an overview of how the encounters have been interpreted and categorized. It has also highlighted recent scientific advances that have a bearing on Buddhism in the fields of the biological and physical sciences, and neuroscience and psychotherapy, as well as the many positive ways in which the studies of Buddhism and science have interacted and can proceed. We can certainly look forward to such encouraging trends, to learning from such fascinating encounters of Buddhism and science.

At the same time, we should bear in mind how the above observations have also highlighted the importance of spiritual practice. As further reiterated by the Dalai Lama “From the Buddhist perspective, a full human understanding must not only offer a coherent account of reality, our means of apprehending it, and the place of consciousness but also include a clear awareness of how we should act.” Here, the emphasis is on leading a life of ethical discipline, cultivating the mind through meditation, and practicing to realize wisdom, enlightenment.

In his article, “Better Than A Hundred Years,” Venerable Bhikkhu Bodhi (2015a) shares his thoughts on the kind of world that may take shape in a century from now, including the possible roles played by Buddhism and science and technology, and stresses the need for a “dimension of transcendence.” He further reminds us from the six stanzas in the “Chapter of the Thousands” of the *Dhammapada*, the centrality of practice:

Better than to live a hundred years immoral and unconcentrated is it to live asingle day virtuous and meditative.
 Better than to live a hundred years foolish and unconcentrated is it to live asingle day wise and meditative.
 Better than to live a hundred years lazy and dissipated is it to live a singleday with energy firmly aroused.
 Better than to live a hundred years without seeing the rise and fall of thingsis it to live a single day seeing the rise and fall of things.
 Better than to live a hundred years without seeing the Deathless is it to live asingle day seeing the Deathless.
 Better than to live a hundred years without seeing the Supreme Truth is it to live a single day seeing the Supreme Truth.

In short, while we can benefit much from exploring the fascinating intellectual terrains of Buddhism and science, we should also remember how spiritual practice can be of great significance in enriching our understanding and insights. In this regard, spiritual practice and scientific inquiry should both be pursued simultaneously. Finally, of the many ways to embark on such a

wondrous journey of exploration, one is to emulate Bodhisattva Samantabhadra's vows in the *Avatamsaka Sūtra* (Cleary, 1993 : 1516).

... Purifying oceans of lands,
Liberating oceans of beings,
Observing oceans of truths,
Plumbing oceans of knowledge,
Perfecting oceans of practices,
Fulfilling oceans of vows,
Serving oceans of buddhas,
May I practice, untiring, for oceans of eons.
The lofty vows of enlightenment practice
Of the buddhas of past, present, and future
May I fulfill completely,
Practice what is good, and realize enlightenment...

References

- Austin, James H. (1998). *Zen and the Brain: Toward an Understanding of Meditation and Consciousness*. Cambridge, Massachusetts: MIT Press.
- Baptist, Egerton C. (1995). *A Glimpse into the Supreme Science of Buddhism*. Colombo. Sri Lanka: Colombo Apothecaries.
- Barash, David P. (2014). *Buddhist Biology: Ancient Eastern Wisdom Meets Modern Western Science*. New York: Oxford University Press.
- Barua, Ankua. (2015). *Dependent Origination, Relativity and Modern Cosmology*. In *Exploring Buddhism & Science*: edited by Venerable Chuan Sheng.
- _____.(2015). *Quantum and the Abhidhamma*. In *Exploring Buddhism & Science*: edited by Venerable Chuan Sheng.
- _____.(2015). *Two Paths to Knowledge*. In *Exploring Buddhism & Science*: edited by Venerable Chuan Sheng.
- _____. (2015). *Realizing Human Happiness: Toward a Noetic Science of Matter, Mind and Spirit*. In *Exploring Buddhism & Science*: edited by Venerable Chuan Sheng.
- _____. (2015) *Varieties of Buddhist Experience, and Quantum Emptiness*. In *Exploring Buddhism & Science*: edited by Venerable Chuan Sheng.
- Bhikkhu Bodhi. (2015). *Better Than A Hundred Years*. In *Exploring Buddhism & Science*: edited by Venerable Chuan Sheng.
- Chuan Sheng (2015). *Exploring Buddhism & Science*. Singapore: Buddhist College of Singapore & Kong Meng San PhorKark See Monastery.
- Cleary, Thomas.(1993). *The Flower Ornament Scripture: A Translation of the Avatamsaka Sutra*. Boston and London: Shambhala.
- Cooper, Robin (1996). *The Evolving Mind: Buddhism, Biology and Consciousness*. Cambridge: Windhorse Publications.
- Davis, Frederick Mark.(1984). *Buddhism and Cosmology*. In *Buddhism and Science*: edited by Buddhadasa P. Kirthisinghe.

- H.H. the Dalai Lama.(2005).*The Universe in a Single Atom: The Convergence of Science and Spirituality*. New York: Morgan Road Books, 2005.
- Lopez, Donald S., Jr.(2008). *Buddhism & Science: A Guide for the Perplexed*. Chicago: University of Chicago Press.
- _____.(2012). *The Scientific Buddha: His Short and Happy Life*. New Haven and London: Yale University Press.
- McMahan, David L.(2008). *The Making of Buddhist Modernism*. New York: Oxford University Press.
- Payutto, P. A.(1995). *Toward Sustainable Science: A Buddhist Look at Trends in Scientific Development. Revised ed. Trans. Bruce Evans*. Bangkok: Buddhadhamma Foundation.
- Waldron, William S. (2000). *Beyond Nature/Nurture: Buddhism and Biology on Interdependence*. Contemporary: Buddhism.
- Wallace, B. Alan (2003). *Buddhism & Science: Breaking New Ground*. New York: Columbia University Press.
- _____.(1996). *Choosing Reality: A Buddhist View of Physics and the Mind*. Ithaca. New York: Snow Lion Publications.
- _____.(2012). *Meditations of a Buddhist Skeptic: A Manifesto for the Mind Sciences and Contemplative Practice*. New York: Columbia University Press.
- _____.(2000). *The Taboo of Subjectivity: Toward a New Science of Consciousness*. Oxford: Oxford University Press.
- _____.(2015).*Energy Dynamics*. In Exploring Buddhism & Science: edited by Venerable Chuan Sheng.
- _____.(2015). *The Potential of Emptiness: Vacuum States of Space and Consciousness*. In Exploring Buddhism & Science: edited by Venerable Chuan Sheng.
- Wang Chi Biu.(1946). *A Scientist's Report on Study of Buddhist Scriptures*.Trans., P. H. Wei.Reprint. Singapore: Wisdom Sutra Distributor.
- Wee, Sin Tho.(2015). *An Introduction to Mindfulness Technique: A Taste of Mindfulness Practice*. In Exploring Buddhism & Science: edited by Venerable Chuan Sheng.
- Yamamoto.(2015). *Shuichi and Victor S. Kuwahara. Modern Cosmology and Buddhism*. In Exploring Buddhism & Science: edited by Venerable Chuan Sheng.