

## Buddhism and Science

Noel Sheth

### Abstract

Although Buddhism was initially against speculation concerning the origin of the cosmos, and although it no doubt has its share of myth and legend, it has generally been open towards Science, and many of its doctrines and beliefs have echoes in Science.

After briefly outlining the history of the relationship between Buddhism and Science, the Paper will bring out some salient parallels between them, both in *method* and *content*. With regard to methodology, the Buddha urges people not to accept things merely on his authority. Buddhism emphasizes personal verification, which accords well with the scientific outlook, which does not accept things from dogma but pays attention to the verification of hard facts. One of the cardinal doctrines of Buddhism is that of Dependent or Conditioned Co-production (*pratitya-samutpada*), according to which no being or event arises without a conditioning factor. One of the principles on which Science operates is universal causation: all material things are caused.

Coming to content, according to Buddhism the cosmos consists of thousands of spherical worlds or *cakkavalas*. In each world system there are thousands of suns, moons, earths, etc. This understanding bears a close resemblance to the modern understanding of the universe with its galaxies. Similarly, it is asserted that evolution (as opposed to creation) is in accordance with Buddhist thought. However, some go to ridiculous lengths, imaginatively finding all types of parallels. E.g., the mention of a “lion’s mouth” in describing the cosmos is said to be a reference to the black holes that devour everything into their gravitational pull.

The Paper will highlight also the similarities between the Buddhist doctrine of emptiness and the Quantum Theory, between the Buddhist understanding of “no-self” and evolutionary biology and developmental psychology, between the Buddhist concept of mind and the cognitive sciences, between the Buddhist idea of emptiness and the mathematical concept of zero, and so and so forth.

On the other hand, Buddhism and Science differ in many ways. For instance, Science concentrates on the external world, while Buddhism pays attention to the inner world of the psyche and to inner peace. Buddhists also critique the scientific method and the objectivity of its results. The idealistic schools of Mahayana Buddhism argued that reality outside was actually a construct of one’s own mind. In Buddhism each being is a series of momentary beings, each one similar to the previous being in the series. Hence, since the observer and the things observed are in constant flux, it is difficult to maintain the objectivity of scientific observation. However, the Buddhist view has also been compared to Heisenberg’s Uncertainty Principle, according to which one cannot simultaneously pinpoint the position and the speed of the subatomic particle. Buddhists are also generally wary of organ transplants and developments in genetic engineering, such as cloning.

The Paper concludes with some suggestions for the future dialogue and complementarity of Buddhism and Science, as both continue to explore the laboratory of life.

### Biography

*Prof. Dr. Noel Sheth, S.J., is the President and Professor of Indian Philosophy and Religion at Jnana-Deepa Vidyapeeth, India's only national institution for the training of Catholic priests and religious leaders. A reputed scholar in Sanskrit and Pali, his name is in the Who's Who of Sanskrit Scholars of India. He stood first in his M.A. (Sanskrit-Pali) in the University of Pune, India, and won several prizes and scholarships. He holds a doctorate in Sanskrit from Harvard University, U.S.A, where he was awarded a full scholarship. He also holds Bachelor's and Master's degrees in Philosophy and in Theology. On several occasions he has chaired sections of the World Sanskrit Conferences. He has published widely in India and abroad, both on Indian religions and comparative theology. His book, The Divinity of Krishna, is mentioned in the Bibliography under "Krishnaism" in the prestigious Encyclopedia of Religion edited by Mircea Eliade. He is a member of several learned bodies. He teaches several courses in Hinduism, a course on Buddhism, and an introductory course on Religions in India, that includes Zoroastrianism, Jainism and Sikhism. He is a member of the Rectors' Committee and of the Administrative Board of the International Federation of Catholic Universities.*

## I. INTRODUCTION

There are two forms of Buddhism, Hinayana and Mahayana. In Hinayana only one school is surviving, viz., Theravada, whose original texts are in the Pali language. In Mahayana there are many schools existing, and their original texts in India were in the Sanskrit language. Although Buddhism was initially against speculation concerning the origin of the universe, and although it doubtless has its share of myth and legend, many of its doctrines have echoes in science.

Several modern Buddhists point out that Buddhism has a “scientific outlook” with regard to morality and religion.<sup>1</sup> The Buddha himself advises people not to accept things merely on authority, but to test things for oneself.<sup>2</sup> This experimental approach which urges people to accept doctrines only after verification is largely true of Buddhism, which is generally free from dogmatism.<sup>3</sup> Occasionally, however, we do come across Scriptural passages, both in Theravada as well as Mahayana, which condemn those who do not accept the authority of the Buddha or do not have faith in a scriptural text.<sup>4</sup> Nevertheless, in this respect, Buddhism is quite similar to science, which insists on the verification of hard facts. Secondly, Buddhists assert that, like science, Buddhism pays attention to cause and effect: everything, including spiritual experiences, except of course the unconditioned state of liberation (Pali *nibbana*; Sanskrit *nirvana*), is subject to the law of causality.<sup>5</sup>

## II. THE INTERACTION BETWEEN BUDDHISM AND SCIENCE

We shall now turn to a brief survey of the relationship between Buddhism and science. In the 19<sup>th</sup> century Buddhism was the object of the “Science of Religion” (*Religionswissenschaft*). Even today much of the religious, sociological and anthropological study of Buddhism and Buddhists takes this approach to Buddhism. In their study of Buddhist meditation and meditators, psychologists and neuroscientists also make them the object of their investigations. There is of course the danger of considering Buddhist meditators merely as objects and thus dehumanizing them. This mode of study also raises various ethical issues.<sup>6</sup> Secondly, some Western historians of science claim that science arose in the West because of the Christian world view, which is linear, rather than cyclic. Christianity, they point out, gives importance to the uniqueness of events, and thus fosters empirical observations necessary for science. On the other hand, they assert that the cyclical world view of Asia was not conducive to the rise of science. This view has been challenged by others, who advance various reasons against it.<sup>7</sup>

More specifically, the relationship of Buddhism and science has taken three forms:

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<sup>1</sup> K. N. Jayatilleke, “Buddhism and the Scientific Revolution”, in Buddhadasa P. Kirtisinghe, ed., *Buddhism and Science* (Delhi: Motilal Banarsidass, 1984), p. 9; The XIVth Dalai Lama, “Understanding and Transforming the Mind”, in B. Alan Wallace, ed., *Buddhism and Science: Breaking New Ground* (New York: Columbia University Press, 2003), p. 102.

<sup>2</sup> *Anguttara-nikaya*, 3.7.5 (Nalanda ed.).

<sup>3</sup> Noel Sheth, S.J., “Buddhism and Communalism”, *Religion and Society* 25:4 (December 1988): 49-51.

<sup>4</sup> *Majjhima-nikaya*, 12.2.9 (Nalanda ed.); *Saddharmapundarika-sutra*, 3.113-135 (Darbhanga ed.). See Sheth, “Buddhism and Communalism”, pp. 48-50, 52.

<sup>5</sup> Jayatilleke, “Buddhism and the Scientific Revolution”, p. 11.

<sup>6</sup> Jose Ignacio Cabezón, “Buddhism and Science: On the Nature of the Dialogue”, in Wallace, ed., *Buddhism and Science*, pp. 36-39.

<sup>7</sup> Cabezón, “Buddhism and Science”, pp. 39-41.

(1) In Asia the advent of Western science was often linked with colonialism, and so Buddhism tended to react with a certain amount of antagonism. Most of the time, though, the attitude was that of ambivalence. On the one hand, some Buddhists, associating science with the Western world view, felt that science would interfere with the Buddhist perspectives on life. Some others were sceptical, for instance, with regard to the efforts of neuro-scientists to measure meditational states of the mind; they were also suspicious that these experiments might adversely affect the efficacy of their meditations. On the other hand, others were more positively inclined towards science and attempted to modernize their educational system by attempting to introduce science into the curriculum.

Scientists, for their part, with their air of colonialist superiority, generally ignored Buddhism, considering it as part and parcel of the Asian culture, which had a rather low estimate in their eyes. In fact, most Buddhists and scientists, even up to this day, have generally shown no interest in each other.

(2) In recent years, however, both a few Buddhists and some scientists began to find similarities between Buddhism and science. While some pointed to analogous goals and results, others referred to similarity in method and content. Indeed, some even went so far as to claim that the two were identical.

(3) While many in the first group emphasized the differences, and those in the second group stressed the similarities, a third group tried to combine both similarities and differences by speaking of complementarity. (a) One type of complementarity lays stress on similarity of method but difference in the subject matter investigated. Thus, for instance, Buddhism, which uses a method similar to that of science, viz., an experimental, verifiable method, studies the inner world of the spirit, while science investigates the outer world of matter. Hence, they can complement each other. Science can benefit by considering consciousness in a non-mechanistic manner and by extending its investigation also to the inner states of the mind. Buddhism is enriched by discovering the more scientific aspects of the external world. (b) Some others emphasize similarity of content and difference in method. Science resorts to a discursive, abstract and analytical method, which yields factual information, while Buddhism uses an experiential, intuitive method, which leads to transformation. Here Buddhism and science can complement each other by extending the horizon of each other's knowledge.

Advanced and specialized studies in science as well as in Buddhism, the greater accessibility of information about each other, and the advent of Buddhism in the West have all led to the breaking down of prejudices and resistance to one another, and a deeper and more sophisticated dialogue between Buddhism and science. In this context, the present Dalai Lama has played a significant role. He has entertained meetings and discussions with physicists, mind scientists and psychologists.<sup>8</sup>

### III. SOME RELEVANT FEATURES OF BUDDHISM

Before we launch into the parallels between Buddhism and science, it would be helpful to mention a few salient features of Buddhism, which have a bearing on our topic. In Theravada<sup>9</sup> beings are not unitary substances or souls, but impersonal mental or physical phenomena, which last only for a moment, such that a being is not a substantial, enduring

<sup>8</sup> Cabezon, "Buddhism and Science: On the Nature of the Dialogue", pp. 41-58.

<sup>9</sup> See Noel Sheth, S.J., "An Introduction to Theravada Buddhism", in Christ Prem Seva Ashram, *Indian Spirituality in Action*, (Bombay: Asian Trading Corporation, 1973), pp. 102-111.

thing, but rather a series of moments, where each succeeding moment is similar to the previous moment, thus giving the false impression of a substance that lasts at least for a certain amount of time. This false impression is only a conventional truth. In reality, each being is not a substance, but an aggregate of material shape, feelings, perceptions, habitual tendencies and consciousness. These five aggregates (Pali *khandhas*, Sanskrit *skandhas*) exist only for a moment, and are succeeded by another set of five aggregates at every moment, so that a being is merely a series of similar but momentary aggregates. This is the absolute or ultimate truth. Thus there are two ‘truths’, conventional and absolute. It should be noted, however, that the external world is real, even if each being is an aggregate existing only for a moment. There is no Supreme Being in Theravada Buddhism. Thus the evolution and dissolution of the universe is not brought about by a Creator or Emanator God.

One of the fundamental tenets of Theravada – and also of Mahayana – Buddhism is called Dependent or Conditioned Origination (Pali *paticca-samuppada*, Sanskrit *pratitya-samutpada*). According to this doctrine, beings or events arise because of conditioning factors: this (resulting) being or event is because that (preceding) being or event is; this (resulting) being or event ceases to exist when that (preceding) being or event ceases to exist. There is a chain of twelve causes or conditions, beginning with ignorance and ending with the whole mass of misery and suffering, such as old age and death. This last or twelfth link conditions the first link of ignorance, and so the cyclic chain continues. It is only when these conditioning factors are got rid of, that one reaches the unconditioned liberation (Pali *nibbana*, Sanskrit *nirvana*). The formulation of the twelve links begins thus: (1) Conditioned by ignorance are the habitual tendencies; (2) Conditioned by the habitual tendencies is consciousness; (3) Conditioned by consciousness is the psycho-physical organism. It will be noticed that in this formulation there is no person who is ignorant or has habitual tendencies or has consciousness or a body, etc. There is only a series of conditioned mental or physical phenomena, without an agent that experiences. There is no substance or soul, but just a stream of momentary aggregates or phenomena, which arise in dependence on other phenomena or events.

While Theravada at least grants the momentary existence or reality of the aggregates, Mahayana asserts that the aggregates themselves are not really existing. There is only one Reality that exists, which is called the Body of Essence (*Dharma-kaya*) or the First Buddha (*Adi Buddha*). While the Yogacara School of Mahayana embraces complete idealism, the Madhyamaka School accepts a practical realism, i.e., even though things do not exist on the absolute level, they exist on the practical or conventional level, on the level of our day-to-day dealings with one another. Ultimately, however, things (except the Body of Essence) do not really exist. The one Absolute Reality is also called Emptiness (*Shunyata*), not because it is empty of existence or reality, but because it is empty of the imperfections of the unreal world. The unreal world is also said to be empty, in the sense that it lacks intrinsic nature. The intrinsic nature of a thing is what that thing is essentially or absolutely, independent of causes or conditions. But, according to the Madhyamaka School, things in the unreal world are relational, dependent on other things. They are like a mirage, which does not have an independent, ultimate existence, but only a relative, conventional existence. Conventionally, fire is intrinsically hot, unlike water, which may be hot, lukewarm or cold. However, for Madhyamaka, fire too is not intrinsically hot. According to the doctrine of Dependent Origination, the existence of fire depends on certain causes: these causes are responsible for the fire coming into existence, and therefore both fire itself as well as its heat are not intrinsic, essential or independent; they exist only in dependence on other causes and conditions, and are not self-sufficient. Hence, like Theravada, the Madhyamaka School too speaks of two “truths”, but they are understood differently. What for Theravada is the absolute truth, viz.,

that beings or phenomena have a real, even if momentary, existence as aggregates, is a conventional truth for the Madhyamaka School. The absolute truth for this school is that the existence of these phenomena is also conventional; they are said to exist only on the practical level, but in the absolute or ultimate sense they are “empty”, or lack intrinsic nature.<sup>10</sup>

I have mentioned the above aspects of certain types of Buddhism, so that I do not have to repeat them when making specific comparisons with science. A few other items will be mentioned at appropriate places in this Paper. We shall now take up some specific areas of comparison between Buddhism and science.

#### IV. BUDDHISM AND COSMOLOGY

Initially, the Buddha criticized various cosmological and cosmogonical speculations about the universe put forward by groups called Eternalists, Extensionists, Chance-Originists, etc. He did not want to indulge in such idle and irrelevant speculations, for he was concerned with the more important question of suffering and the means to get out of suffering.<sup>11</sup> However, at a later stage, Buddhist texts gave detailed descriptions of the cosmos, because it played a role in one’s striving towards salvation.

In Theravada we have a single-world system and a multiple world system. In the single world system the universe is a flat disk called *cakkavala*, with heavens and meditation realms above the disk and various hells below it. At the centre of the *cakkavala* is the circular Mount Meru. Six more circular mountains surround the *cakkavala*. The space between the mountains is filled with various oceans. In one of the oceans, called the Great Ocean (*Mahasamudra*) are located four islands, which are situated in the North, South, East and West. Human beings live on the island called Jambudipa. Various heavens hover above the *cakkavala*, arranged in three layers or worlds, viz., (a) the worlds of desire (*kama-loka*), (b) the worlds of form (*rupa-loka*), in which there are four types of “meditation worlds”, and (c) the worlds of non-form (*arupa-loka*). The hells are situated below the Jambudipa Island.<sup>12</sup>

In the multiple world system there are three universes: (1) A system of one thousand small worlds (*culanika lokadhatu*); (2) A system of one million middle worlds (*majjhimika lokadhatu*), which consists of one thousand small worlds; (3) A system of one billion great worlds (*mahasahassi lokadhatu*), which contains one thousand middle worlds.<sup>13</sup> Each of these billion great worlds is comprised of a *cakkavala*, with the seven concentric mountains, and a sun and a moon. The whole world system lasts for a *mahakalpa*, i.e., 1,000,000,000 years, after which it dissolves and then evolves once again.<sup>14</sup>

The Mahayana speaks of innumerable (*asankhyeya*) world systems spread out over ten regions of space. Some of these worlds are pure, others are impure and still others are mixed.<sup>15</sup>

<sup>10</sup> William L. Ames, “Emptiness and Quantum Theory”, in Wallace, ed., *Buddhism and Science*, pp. 299-300.

<sup>11</sup> *Brahmajala-sutta*, in *Digha-nikaya* 1, p. 13ff; *Pasadika-sutta*, in *Digha-nikaya*, 3, p.137f. Other such references are found in the *Majjhima-nikaya*, 1, 426ff, 483ff; *Anguttara-nikaya*, 2, p. 80. (The references are to the Pali Text Society ed.)

<sup>12</sup> For details, see Vasubandhu, *Abhidharmakosha*, tr. by Louis de La Vallée Poussin, as *L’Abhidharmakosha de Vasubandhu*, 6 vols. (1923-1931; reprint Brussels, 1971).

<sup>13</sup> *Anguttara-nikaya*, 1, p. 227 (PTS ed.).

<sup>14</sup> *Abhidharmakosha*, 3, pp. 138-141.

<sup>15</sup> *Encyclopedia of Religion*, ed. Mircea Eliade, s.v. “Buddhist Cosmology”, by W. Randolph Kloetzli.

Although both the Theravada and Mahayana conceptions of the cosmos are couched in mythical language, one can find several parallels with the scientific understandings of the universe. In this context, one can find more similarities between science and the Buddhist multi-world or innumerable world systems than with the Buddhist single-world system. For instance, in the multi-world system the first level or the Small World System has been compared with a galaxy with its stars and planets. The Middle World System is similar to groups of galaxies, existing for instance in Coma Berenices. The third tier, viz., the Great World System, corresponds to a Metagalaxy like the Big Dipper, which is said to be the cradle of at least a million galaxies.<sup>16</sup>

Some even attempt to correlate the Buddhist texts with the shapes of galaxies. The term *cakkavala* is derived from the Pali word *cakka* (or Sanskrit *cakra*) which means a sphere or a wheel. This is said to correspond to the spiral galaxies. The *Hwa Yen Sutra*, the Chinese version of the original Sanskrit *Garland Sutra*, also refers to worlds that spin like a wheel and others that look like shining wheels. The sutra speaks of some worlds which are thin, and these are said to be the barred spiral galaxies. Worlds that have the shape of sea shells are easily related with spiral galaxies. On the other hand, Davis seems to stretch our imaginations to incredulity by connecting worlds that are shaped like a flower to intergalactic rings of gas, or by claiming that the mention of a volcano refers either to galaxies that explode, e.g., Quasar 3C273 or Galaxy M87 in Virgo, or to nova and supernova stars. Similarly, the mention of a lion's mouth is said to allude to a black hole that devours everything into its gravitational jaw. We should be thankful that he does not connect worlds which are square with any heavenly body.<sup>17</sup>

The *Hwa Yen Sutra* also tells us that while some worlds exist for a relatively short time, others last for a very long time; some again, arise anew, and others perish. These correspond to stars that are young or old, to stars that are white dwarfs or red giants or black holes. The sutra also speaks of worlds whose surface is rock-torn. These remind one of planets like Mars.<sup>18</sup>

In consonance with many Eastern traditions, Buddhism holds that the universe goes through cycles of evolution and dissolution. This has been compared to the Theory of the Oscillating Universe, which expands and contracts. More specifically, Buddhists subscribe to a theory not just of one oscillating universe, but of a series of oscillating universes, each having a Big Bang and a Big Crunch. This theory of the Oscillating Universe, however, is not accepted by many astronomers.<sup>19</sup> On the other hand, others compare the Buddhist understanding of a universe that is a series of continuous moments to the Steady State Theory, again a theory that is rejected by many scientists.<sup>20</sup> The Buddhist texts mention beings quite different from human beings that populate many of the worlds. They also speak of various beings that visit our earth. These references are simplistically said to point to intelligent life on other planets and to aliens visiting earth from extra-terrestrial worlds.<sup>21</sup>

## V. BUDDHISM AND CLASSICAL PHYSICS

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<sup>16</sup> F. Mark Davis, "Buddhism and Cosmology", in Buddhadasa P. Kirthisinghe, *Buddhism and Science* (Delhi: Motilal Banarsidass, 1984), p. 61.

<sup>17</sup> *Ibid.*, pp. 62-66.

<sup>18</sup> *Ibid.*, pp. 66-68.

<sup>19</sup> *Ibid.*, p. 68.

<sup>20</sup> Kirthisinghe, "The Universe and Cosmology", in Kirthisinghe, ed., *Buddhism and Science*, pp. 85-86.

<sup>21</sup> *Ibid.*, pp. 86-87.

In Buddhist Abhidharma texts, which belong to the Theravada tradition, the impersonal, non-substantial and momentary mental or physical phenomena are called *dharmas*. In pre-Einstein physics or classical physics, the understanding was that the physical world consisted of particles of matter that interacted with one another through forces, which followed deterministic mathematical laws. Both Abhidharma and classical physics consider beings to be impersonal units called particles and forces in classical physics and *dharmas* in Abhidharma. These units interact with each other through physical laws of cause and effect in physics or through the process of dependent origination in Buddhism. Conventional truth tells us, say, that a pen is on the desk. But according to classical physics, the real truth is that the pen and the desk are aggregates of atoms interacting through different forces. For Abhidharma, too, the pen and the desk are *dharmas* that act on one another through causes or conditions operating according to the principle of dependent origination. In both cases the particles or *dharmas* really exist and can be definitely known. On the other hand, there are also differences between the two. The *dharmas* are directly experienced, while particles and forces are known through mathematical laws and theories. Most of the *dharmas* are mental, while physics pays attention only to the material world. Moreover, the *dharmas* are momentary, while the atoms do not change, for in classical physics change is brought about by the motion of atoms and forces that influence the motion. The purpose of Abhidharma is to attain *nibbana* or liberation, while physics does not have such other-worldly goals.<sup>22</sup>

## VI. BUDDHISM AND QUANTUM PHYSICS

As, we have seen, according to the Madhyamaka School of Mahayana Buddhism, all phenomena or *dharmas* have no intrinsic nature, but depend on extrinsic causes and conditions. In other words, every phenomenon is relational, so that there is no “fixed point” or essence that makes it what it is: in itself, irrespective of its conditioning causes, it is nothing.

In Quantum Physics many properties of things like the electrons, do not have an intrinsic wave nature or particle nature: in some experiments they act like waves, in other experiments they act like particles. Thus such qualities are not intrinsic, but are dependent on a particular experiment. In Mahayana too this is the case. The difference, however, is that in the latter nothing (except the Supreme Body of Essence) has intrinsic nature, whereas certain properties of the electron, such as its rest mass, are intrinsic to it.<sup>23</sup> Secondly, in Quantum Theory the behaviour of the electron as a wave or a particle depends on the observer, the one who performs the experiment. The observer does not merely look at the electron objectively, but in some way determines what the electron is, i.e., whether it is a wave or a particle. In Madhyamaka too the object depends on the subject and vice-versa: both are related to each other, but do not have an intrinsic existence. The difference, however, is that, unlike in Madyamaka, not all the properties of the electron are dependent on the observer. Finally, of course, Madyamaka’s goal is liberation or salvation, while this is not the aim of Quantum Physics.<sup>24</sup>

## VI. BUDDHISM AND THE RELATIVITY OF TIME IN MODERN PHYSICS

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<sup>22</sup> William L. Ames, “Emptiness and Quantum Theory”, in Wallace, ed., *Buddhism and Science*, pp. 288-293.

<sup>23</sup> Making a reference to Heisenberg’s conclusion that atoms and particles are not real, Matthieu Ricard concludes that, if the reality of the world at the microscopic level is called into question, then it follows that the world is an illusion also at the macroscopic level: Matthieu Ricard, “On the Relevance of a Contemplative Science”, in Wallace, *Buddhism and Science*, p. 274. However, he neglects the fact that the rest mass of the electron is intrinsic to it.

<sup>24</sup> Ames, “Emptiness and Quantum Theory”, pp. 298-302.

In consonance with the doctrine of emptiness, where things are empty of inherent nature, are impermanent, and dependent on or related to their causes and conditions and on the mental designation of those things as having such and such names (but actually devoid of essence), the Madhyamaka view is that time lacks inherent, permanent nature, and is only a set of dependent relations.<sup>25</sup> Now, in modern Physics too, and more specifically according to Einstein's Theory of Relativity, time is relative, for it depends on a particular reference frame, i.e., it depends on the relationship of an object with the one who is observing that object. For instance, if seeds grown on earth take 70 days to reach harvest time, then, if the same seeds are grown in a space ship traveling at 90 percent of the speed of light relative to the earth, it would take 161 days, as measured by an observer on earth. Time is not intrinsically fixed, but is relational. In Madhyamaka terms, time does not have intrinsic, independent nature.<sup>26</sup>

## VII. BUDDHISM AND EVOLUTIONARY BIOLOGY

We have seen that in Buddhism we are not substantial selves, but a series of momentary aggregates (*khandhas* or *skandhas*). We do not have a permanent, essential identity or inherent nature. A false sense of identity, however, is created by the three primary afflictions (*klesha*), viz., attachment or passion (*raga*), hatred or aggression (Pali *dosa*; Sanskrit *dvesha*) and ignorance or delusion (*moha*). Due to these afflictions, we engage in various actions (*karman*). And the whole sentient world is the result of the collective actions (*karman*) of different living beings down the ages.<sup>27</sup> Now, according to some evolutionary biologists, human beings, like all other species, do not have an essential human nature, a permanent "species-essence", but rather are the evolutionary result of the actions of a series of organisms extending over a long period of time. Our abilities to collect food, obtain shelter, reproduce, nay, even to think, love and hate and to interact with other beings are all derived from and dependent on the actions of previous organisms, starting from the simple, single-cell organisms and extending right down to complex human beings.<sup>28</sup> It should be noted, however, that Buddhism and evolutionary biology also differ in some respects. Buddhism, for instance, is concerned with individual series of aggregates being reborn through many lives, while evolutionary biology focuses on gene pools and their developments.<sup>29</sup>

In Buddhism the three main afflictions (*klesha*) are present in us in a germinal form even at birth and give rise to the false notion of a substantial self. Even an infant has this latent tendency.<sup>30</sup> This inclination to self-identity makes most of us tend to take our bodies and their functions as constituting a self. There is a pervasive sense of "I am", "This is mine", "This is my self".<sup>31</sup> This sense of self is very difficult to eradicate even for someone who is noble (*arya*), i.e., advanced in spiritual life.<sup>32</sup> Now, as in the case of the Buddhist afflictive emotions (*kleshas*), evolutionary biologists point out that, although the human brain, with its neocortex, is far more advanced than the ancestral reptilian and mammalian brains, yet our latent animal instincts often overshadow our rationality, and we yield to the emotions of anger, fear and passion. We are often under the spell of these latent emotions from our

<sup>25</sup> Victor Mansfield, "Time and Impermanence in Middle Way Buddhism and Modern Physics", in Wallace, ed., *Buddhism and Science*, pp. 309 and 317.

<sup>26</sup> *Ibid.*, p. 311.

<sup>27</sup> "The variety of the world arises from action (*karman*)....The latent afflictions are the root of existence (*bhava*)" (Vasubandhu, *Abhidharmakoshabhasya*, 5. 1a).

<sup>28</sup> William S. Waldron, "Common Ground, Common Cause: Buddhism and Science on the Afflictions of Identity", in Wallace, ed., *Buddhism and Science*, pp. 146-153.

<sup>29</sup> *Ibid.*, n. 19.

<sup>30</sup> *Malunkya-sutta*, in *Majjhima-nikaya*, 1. 433 (PTS ed.).

<sup>31</sup> *Majjhima-nikaya*, 3. 285 (PTS ed.).

<sup>32</sup> *Sutta-nipata*, 3. 131 (PTS ed.).

evolutionary past.<sup>33</sup> Moreover, like Buddhism, some claim that our conviction that we are a self, an individual, in control of our psychological processes is actually an illusion, for consciousness is not an active agent, but only a witness that accompanies the generally unconscious processes of the brain. This illusion came about because it helped us to survive and to have a sense of reality and of being in control.<sup>34</sup>

This sense of self-identity, however, is not merely something that we have inherited through evolution, but it is also constantly created and bolstered by our social and cultural encounters with one another. According to this view, then, genetic characteristics and social surroundings interact mutually to give us the false sense of individuality or selfhood. It should however be remarked that, in this context of the discussion of “nature” and “nurture”, some behaviourists assert that human nature is essentially evil and beyond redemption, while others vehemently maintain that humans are not the product of their genes but rather are solely influenced and formed by their social surroundings. Finally, both according to Buddhism as well as according to some of these evolutionary biologists, this false ego can be got rid of at least by some people by dint of meditation and effort.<sup>35</sup>

## IX CONCLUSION

This Paper is far from being an exhaustive survey of parallels between Buddhism and science. There are several other points of convergence. For example, the Buddhist idea of emptiness (*shunyata*) can be related to the zero in Mathematics. What is interesting here is that just as zero stands for nothing as well as infinity, the term *shunya* means both empty as well as full: the world is empty of intrinsic nature, it is non-existent; but the Supreme Body of Essence (*Dharma-kaya*) is empty of imperfections, but also full of perfections.

It will not have gone unnoticed that, in the parallels that we have drawn between Buddhism and science, many of the similarities are also accompanied by differences. In fact, Buddhism has also expressed disagreement with some developments in modern science. For instance, many Buddhists are against organ transplants. They do not agree that the absence of brain activity indicates the death of a person because they connect life with the activity of the heart and lungs. As long as a body is warm, it is said to have life. They are also generally wary of genetic engineering, which appears to interfere with the karmic relationships between past generations and future generations.

The point I want to make is that Buddhism and science are not so much similar, still less identical, but that they are complementary. In the words of Cabezon, “Science is concerned with the exterior world, Buddhism with the interior one. Science deals with matter, Buddhism with mind. Science is the hardware, Buddhism the software. Science is rationalist, Buddhism is experiential. Science is quantitative, Buddhism qualitative. Science is conventional, Buddhism contemplative. Science advances us materially, Buddhism spiritually. But whether the difference is identified principally in terms of content, of method, or of goal, the perceived problem – diagnosed in terms of the overemphasizing of one of the two elements – is overcome by a balance that is achieved when the two parts are brought together harmoniously. Unlike conflict/ambivalence as a mode, the logic of complementarity eschews the kind of triumphalism in which one of the two spheres emerges as victorious over

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<sup>33</sup> J. Barkow, *Darwin, Sex, and Status* (Toronto: University of Toronto, 1989), p. 121f, cited by Waldron, “Common Ground, Common Cause”, p. 157.

<sup>34</sup> See the references to Rune Johansson, Henry Stack Sullivan, Richard Restak and Michael Gazzaniga in Waldron, “Common Ground, Common Cause”, nn. 34-36.

<sup>35</sup> Waldron, “Common Ground, Common Cause”, pp.153-160.

the other. Unlike identity/compatibility as a mode, by holding firmly to the notion of irreconcilable differences it refuses to allow either Buddhism or science to be reduced to the other.”<sup>36</sup>

On the other hand, Cabezon rightly cautions us not to make Buddhism and science water-tight compartments. For example, while Buddhism is surely concerned with the world of the spirit, it also analyses matter. Similarly, Buddhism cannot have the monopoly of the study of the mind; cognitive science too can contribute to the understanding of the mind.<sup>37</sup> In this context, Buddhism and science can cooperate together in exploring human life. Science need not confine itself to the object of experience and neglect the subject. Already quantum physics has brought home to us that the object cannot be studied independent of the observing subject; computer science and artificial intelligence are already dealing with the problem of making artificial subjects.<sup>38</sup> In Buddhist countries science is already studied in schools and colleges.

It is also worth mentioning that while we point out similarities between Buddhism and science, we should remember that scientific theories keep changing,<sup>39</sup> and so the parallelism between both is not something that is necessarily perennial. In a sense, Buddhism too has different views, if one considers its various schools: some are realistic, some idealistic, some – like the extinct Sammitiya School – accept a permanent substance, others insist on impermanence and momentariness, and so on and so forth.

Over the last few years the dialogue between Buddhism and science has been advancing. Up to now, however, the dialogue seems to largely confine itself to the informative dimension, accepting the differences respectfully. Buddhists and scientists, we hope, will also have the courage to engage in serious dialogue also on controversial matters, challenging one another, as they both together explore the laboratory of life.<sup>40</sup>

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<sup>36</sup> Cabezon, “Buddhism and Science”, p. 50.

<sup>37</sup> Cabezon, “Buddhism and Science”, p. 58.

<sup>38</sup> Piet Hut, “Conclusion: Life as a Laboratory”, in Wallace, ed., *Buddhism and Science*, pp. 412-414.

<sup>39</sup> Victor Mansfield, “Time and Impermanence”, p. 316.

<sup>40</sup> Cabezon, “Buddhism and Science”, pp. 58-60.