Investigating the 'Science' in 'Eastern Religions':

A methodological inquiry

The trope of 'science and religion' is usually employed in western academic circles as a shorthand for the historical narratives and the philosophical analyses of the various overlaps, oppositions, and disjunctions between empirical scientific methodologies and specifically Christian doctrines of God, creation, and redemption. Over the last five decades or so, the key terms 'science' and 'religion', understood in terms of these referents, have been minutely scrutinised, and various typologies of the relations, some more amicable than the others, between these categories have been proposed. More recently, the rubric of 'Eastern Religions' has sometimes been added to these discussions, where this category encompasses diverse spiritual strands which have received varying degrees of scholarly attention. The engagements of Tibetan Mahayana Buddhisms with quantum physics and neurobiology have been quite extensively studied, and various interpretations of the empirical sciences have been offered also from certain Hindu Vedantic perspectives. From a historical perspective, there is a conceptual-institutional divergence between the discourses of 'science and Christianity' and of 'science and eastern religions', in that while European science and Christianity emerged from a common intellectual and institutional matrix of post-Reformation cultures, and were thus crucially shaped by their mutual borrowings and hostilities, European science is a more recent arrival in various parts of south Asia, often in circumstances shaped by colonial power. While 'science' and 'religion' can be definitionally imprecise in some European contexts, these terms arguably become even more semantically nebulous in some non-western contexts. We shall explore in this essay some of the understandings of 'science' that are deployed in the literature on 'science and eastern

religions', for it is these understandings that crucially shape the raging debates between the avid proponents and the keen detractors of the thesis that eastern forms of spirituality are uniquely able to subsume the sciences into their metaphysical-axiological horizons. More specifically, we shall explore some of the proposed relations between 'science' and 'eastern religions' by highlighting three themes: (a) the relation between science and metaphysics, (b) the relation between science and experience, and (c) the European origins of science. We will note that under (a) and (b), it is often claimed that the methodologies of the empirical sciences currently lack ontological foundations, which can be supplied by certain (supra-)experientialist types of eastern spiritualities. A somewhat different style of intervention (c) into these debates is that science is merely a parochial western knowledge system, so that it should either be rejected altogether or chastened by integrating some of its aspects into eastern spiritualities. The analysis of these claims requires a methodological inquiry into some of the culturally freighted valences of 'science', 'metaphysics', and 'experience'.

Science and Metaphysics

A fundamental debate in current philosophy of science is whether the scientific enterprise is self-explanatory or whether it requires certain extra-scientific ('metaphysical') justifications. Those who argue for the latter view state that the scientific enterprise is based on some conceptual presuppositions which cannot be provided by or defended from its own methodological resources. For instance, scientists in their everyday theorising and observations presuppose the truth of certain propositions such as these: the structures of reality are rationally comprehensible, certain natural patterns are (relatively) uniform and invariant, the 'external' world is logically independent of the mind, and so on. However, these propositions are strictly speaking extra-scientific, in that they do not figure as

observational premises or data of scientific theories. The fact that it would be psychologically difficult (if not impossible) for a scientist who believes that deep reality is fundamentally inscrutable and chaotic to conduct specific lines of scientific inquiry should be taken as suggesting, according to this view, that such deep uniformity is an (unexamined) extra-scientific condition of the possibility of everyday science. Such a proposed move from science to its metaphysical foundations would have been resisted by the logical positivists, for whom a statement is meaningful only if it is verifiable through human experience. Consequently, all statements which are not subject to verification, either in fact or in principle (such as 'all deep reality is rationally explicable'), should be dismissed as metaphysical and literally nonsensical. The scientific enterprise, in particular, only outlines empirical patterns and uses them to make predictions, without appealing to non-observable theoretical entities. The alleged 'depths' of metaphysical reasoning are therefore to be rejected, for as R. Carnap, O. Hahn, and M. Neurath argued: 'In science there are no 'depths'; there is surface everywhere' (Neurath and Cohen 1973: 306). More recent decades, however, have witnessed a revival, among some philosophers of science, of a certain kind of metaphysics, where metaphysical enquiries are not dismissed, by definition, as meaningless, provided they are circumscribed by the empirical results of the sciences. Metaphysics, on this view, would be 'naturalised' in the sense that it would seek not to develop grand ontologies but to unify into conceptual systems the various hypotheses and theories which are offered by contemporary science. Therefore, metaphysics understood in traditional terms as a search for the basic structures of reality can be retained, so long as this inquiry is not based on *a priori* reasoning, speculative thinking, or intuitions, but is informed by the empirical content provided by science (Ross, Ladyman and Kincaid 2013).

The ‘naturalization’ proposed for metaphysics has also been attempted for various fields ranging from epistemology to ethics, where it is claimed that purely ‘naturalist’ descriptions can be provided for their contents (Gasser 2007). While ‘naturalism’ has turned out to be difficult to define with precision, one negative understanding is the view that ‘reality consists solely of the physical, spatio-temporal world’ (Smith 2012:1). That is, ‘naturalism’, according to O. Flanagan, is (minimally) opposed to ‘supernaturalism’, which states that (i) there are super-natural entities ‘outside’ the natural world, (ii) which are in causal interaction with the world, (iii) though there are no reliable epistemic means for justifying belief in these entities or in this interaction. However, philosophers who endorse forms of ontological naturalism often disagree about precisely what it excludes – some naturalists accept the existence of numbers, meanings, universals, and so on. Thus, noting that ontological naturalism is the view that ‘for all we know and can know’ the natural world is the totality of what there is, Flanagan (2006: 438) argues that the notion of the ‘natural’ is somewhat vague, and ‘the central concept in the motto lacks a clear and determinate meaning’. Notwithstanding this ambiguity, ontological naturalists tend to view the self, free agency, intentionality, and so on as ultimately properties of complex physical systems. Closely related to this position is ‘scientism’ which is the view that science supplies the correct and the most complete description of these systems, because everything is made up of the basic kinds of things that are catalogued by science (Rosenberg 2011). Because science is our only means of access to reality, beliefs which can be rationally held are those which can be scientifically established, and the only reality we can meaningfully speak about is the one that science investigates. For instance, the so-called mystery of consciousness is not quite an enigma, for all mental phenomena can ultimately be reduced – both explanatorily and ontologically – to the entities and the categories employed in physical theories (Crick 1994:3). The fundamental debate in this context is whether ontological naturalism – the metaphysical stance that only

those entities which can be unearthed through the tools of the empirical scientific disciplines are to be accorded reality – is logically necessitated by scientific methodology or is an extra-scientific ('metaphysical') claim. Scientism's claim that there is no question which in principle cannot be answered by science and that the only rationally justifiable beliefs about reality are the ones that are accepted within science would place it at loggerheads with most religious views. R. Trigg (2015: 35) argues, however, that this is a 'global claim going far beyond the remit of science. Those who make it have to stand outside all science and make a judgement about its scope'. According to Trigg, the view that the entities that turn up in a scientific ontology exhaust 'reality' is a metaphysical claim which cannot be justified from within science.

The significance of these debates over 'what there is' for our purposes is this: thinkers from various Hindu and Buddhist universes have claimed that these operate with notions of 'naturalism' which do not equate with 'reality' only those entities that are enumerated in scientific classifications. Developing this theme from a Hindu perspective, S. Menon (2006:11) argues: 'Reason and experiments are … not the only valid means of knowing. Depending on the domain of study, reflection, inner transformation, and ontological insights also are means of knowledge … The Truth that was pursued demanded a means that is a blend of personal and social engagement, ecological awareness, and advanced mathematics'. Similarly, arguing that there are experiential aspects of human existence which cannot be circumscribed by syllogistic arguments, V.V. Raman (1997:18) writes that 'there is often an eagerness to find scientific support for trans-rational matters also. It is futile and irrelevant to look for scientific buttressing for them … Vedāntic vision belongs to the trans-rational category'.

B.A. Wallace argues, in this vein, that Buddhism is a form of naturalism that seeks to develop hypotheses about the mind and its relation to the natural environment. Wallace argues that these have been experientially confirmed in the Buddhist traditions over the last 2,500 years with the help of meditative techniques which are duplicable by trained individuals. The Buddhist claim that underlying the individual mind, there is a continuum of awareness that precedes the present life and continues after death (*ālayavijñāna*) can be tested by Buddhist contemplatives, by undergoing training in deep meditative calm (*samādhi*) which might take up to 20,000 hours. This mental continuum can be accessed not through the quantitative, externalist, and objective tools of science but through the first-person meditative methods which are outlined in the Buddhist traditions: 'Just as the existence of the moons of Jupiter can be verified only by those who gaze through a telescope, so the existence of subtle dimensions of consciousness can be verified experientially only by those willing to devote themselves to years of rigorous attentional training' (Wallace 2006:36). However, a crucial difference between science and Buddhist naturalism is that while the former attributes causal powers only to objectifiable and quantifiable physical phenomena, the latter also includes mental phenomena in its understanding of the structures of empirical reality (Wallace 2003: 8). Therefore, on the one hand, Buddhism has scientific credentials in that individuals have to be socialised into Buddhist paradigms of meditative practices before they can have experiential verification of Buddhist truths. Just as scientists do not individually test every hypothesis, but have to depend on complex networks of trust, Buddhist meditation too is carried out within institutional and conceptual systems. On the other hand, these Buddhist truths relating to a non-physical continuum of cognitions presuppose an ontology that is wider than is available in many current versions of naturalism. The significance of these metaphysical disputes is highlighted by the following observation of T. Jinpa on some

contemporary Buddhist dialogues with western science: ‘Scientists who engage with Tibetan scholars notice how questions immediately turn to the theoretical and philosophical implications of specific scientific views rather than focusing on the details of the content of a particular concept’ (Jinpa 2010: 878). These two distinct forms of enquiries also structure, according Jinpa, the Dalai Lama’s own engagements with science. First, on matters such as the understanding of the emotions or the implications of quantum physics, the emphasis is on science and Buddhism as two ‘investigative traditions’ that can collaborate to increase human knowledge and promote human well-being. At this level, the ‘more metaphysical aspects of the two traditions – the concepts of rebirth, karma, and the possibility of full enlightenment of Buddhism; and physicalism, reductionism, and the causal closure principle on the part of the scientific worldview – are left bracketed’ (Jinpa 2010: 876–77). The second dimension is specifically relevant to the reformulation of traditional Buddhism, and consists of incorporating aspects of the scientific worldview which have been empirically tested, and responding to challenges posed by this worldview to Buddhist doctrines. As a result of the interweaving of these layers, when western scientists enter into dialogue with Tibetan Buddhism, which ties together Nagarjuna’s teachings on emptiness (*sunyata*), rich Abhidharma taxonomies of types of mental events, and compassion as the central ethical value, they engage with a ‘complex yet integrative tradition, which defies any modern categories of philosophy, religion and science …’ (Jinpa 2010:875).

Regarding the first of these levels, the Dalai Lama writes that Einstein’s theory of relativity has given him an empirical texture for his understanding of Nāgārjuna’s notion of emptiness, the behaviour of quantum entities has highlighted the Buddha’s teaching of transience, and the discovery of the genome points to the Buddhist view of the fundamental equality of all

beings (Dalai Lama 2005: 206). Both Buddhism and science also share a fundamental methodological attitude of continuing to search for reality through empirical means, and discarding firmly-held positions if these are found to be false. He notes that the Buddha himself exhorted his disciples not to follow his teachings merely on the basis of reverence to him, but to test them through 'reasoned examination and personal experiment' (2005: 24). He even claims that 'if scientific analysis were conclusively to demonstrate certain claims in Buddhism to be false, then we must accept the findings of science and abandon those claims' (2005:3). However, at the second level of the defense of Buddhist standpoints relating to rebirth and the cultivation of compassion, the Dalai Lama argues that certain deep truths are not accessible to those without scriptural testimony: 'From the Buddhist point of view, there is a further level of reality, which may remain obscure to the unenlightened mind. Traditionally, a typical illustration of this would be the most subtle workings of the law of karma … Only in this category of propositions is scripture cited as a potentially correct source of authority, on the specific basis that for Buddhists, the testimony of the Buddha has proven to be reliable in the examination of the nature of existence and the path to liberation' (2005:28). From the perspective of Buddhist enlightenment, one would reject the neo-Darwinian view that biological mutations are purely random events, or forms of physicalism that would reduce mental events to materiality. For the Dalai Lama, the opposition here is not between two varieties of empirical statements but two metaphysical stances: 'From the scientific view, the theory of karma may be a metaphysical assumption – but it is no more so than the assumption that all of life is material and originated out of pure chance' (2005:110).

Science and Experience

If the debate over 'science' in Eastern religions or Eastern mysticism (the categories often employed in the literature to refer to spiritual systems of Indic or Chinese origins) is thus partly over whether or not science is logically connected to ontological naturalism or scientism, it is also partly over the role of experience in the scientific enterprise. A significant amount of the literature on science and eastern mysticism is based on the claim that the 'new physics', which has supposedly re-introduced the observer into the heart of scientific theory, can be readily aligned with 'eastern mysticism' which is said to have foregrounded the role of experience, mind, or consciousness in constituting physical realities. The views of the eastern mystics on the phenomenality of space, time, causation, and so on are often said to parallel modern physics. These claims touch on the intensely debated philosophical theme, especially between K. Popper and T.S. Kuhn, of the relationship between 'theory' and 'experience' in science. On the one hand, science is not purely an empiricist accumulation of data: Popper (2002: 16) criticised the 'bucket theory' of the mind, which views humans as largely passive in receiving data which is then used to formulate hypotheses and deduce theories, on the grounds that it obscures the active role of the mind in framing speculative ('metaphysical') hypotheses, some of which have aided the development of scientific theories. The Popperian emphasis on speculative thinking is reflected in the following claim by J. Hartle and M. Srednicki: 'The course of physics, both theoretically and experimentally, is guided by prejudice as to the nature of the theory sought for. We favor theories that are simple, beautiful, precisely formulable mathematically, economical in their assumptions,

comprehensive, unifying, explanatory, accessible to existing intuition, etc. Most importantly we favor theories that are successful in predicting new data beyond what we have at the moment. The bases for such prejudices do not lie in logic but rather previous experience with constructing successful theories'. On the other hand, science is not simply a system of abstract ideas connected through logical structures and mathematical formulations, for the physical universe cannot be spun out of conceptual entailments. Rather, the contingent data that the physical sciences work with – the birth of stars, falling apples, and shifting tides – has to be formulated into mathematical equations of (arguably) unvarying laws. However, the question of the relative significance of conceptual elegance versus experimental testability in a scientific theory remains a disputed matter: for instance, string theory, which was developed to unify the theory of general relativity and quantum mechanics, has often been criticised on the grounds that it is yet to make predictions which can be experimentally tested. However, Brian Greene defends string theory in terms of certain theoretical virtues: 'In a *single* framework, it handles the domains claimed by relativity and the quantum. Moreover, … string theory does so in a manner that fully embraces all the discoveries that preceded it' (Greene 2011:94). As critics of Popper have noted, when a theory comes up against recalcitrant data, it is not conclusively rejected straightaway. Rather, if the theory is able to explain other sets of data reasonably well, it is allowed to stand in the absence of a better theory (Lakatos 1970:173).

The basic questions underlying the literature on 'quantum mysticism', then, are these: (i) whether quantum physics indeed repositions the observer in the role of 'constituting' reality through experience, spirit, or consciousness, and (ii) whether a certain form of eastern mysticism provides the theoretical support for the empirical claims of quantum physics on an

interpretation that provides an affirmative response to (i) (Goswami 2001). According to the so-called Copenhagen interpretation of quantum physics, uncertainty, indeterminacy, and probability are objective or intrinsic features of quantum phenomena, and not merely epistemic features of our lack of knowledge. Further, a quantum system is completely described by a mathematical wave-function which is a 'superposition' of several possible outcomes, and the measurement interaction between this system and a macroscopic detector 'collapses' or 'reduces' the wave-function to one determinate outcome. However, there is no consensus among scientists about this so-called measurement problem: there are several interpretations of quantum mechanics, which produce the same experimental results, so that they differ only in their metaphysical implications (Omnès 1994). According to the multiverse interpretation, all the different possible outcomes of a quantum measurement are actualised, but in different parallel universes. Some idealist interpretations of quantum mechanics argue that it is human consciousness which constitutes reality, by 'collapsing' the wave-functions, so that the human observer and what is being observed become co-constituting elements (Wheeler 1977). One possibility here is that while physical properties such as position, momentum, charge and so on exist in indeterminate states of 'superpositions', mental states, because they are distinct from brain states, can 'collapse' these wave functions (Halvorson 2011). According to an instrumentalist approach, however, the mathematical formalism of quantum mechanics should be seen merely as predictive or calculational tools, which do not give us any insights into the deep structures of reality.

However, contemporary Hindu writers on quantum physics often highlight the idealistic interpretations, and correlate these with certain readings of the classical Vedantic system of Advaita, according to which Brahman is the timeless, indivisible, and formless ground of all phenomenal reality which is insubstantial (*māyā*). Thus Swami Jitatmananda (2006:2) argues

that physicists are being led towards a vision of unification, not only of the four fundamental physical forces, but also of subject and object by scientific experimental results: 'A scientist is no more a detached observer but is an active participator in the very processes of his experimentation. Physics has already entered the areas of Eastern mysticism'. He presents the Advaitic doctrines as teaching that the phenomenal world is a deeply interconnected reality, in which to search for an isolated and independent entity such as an electron is a misconception (*māyā*). Similarly, N.C. Panda (1991: 306–307) argues that at the microscopic dimensions we are dealing not with reality-itself but with probabilities or mathematical wave-functions which are our cognitive constructions. Therefore, quantum physics employs the word 'participator' rather than 'observer', since to some degree we create the reality that we interact with. Because the subatomic particles are not substantively real but are products of human interactions with deep reality, he concludes: 'Both quantum physicists and the non-dualistic philosophers of Advaita Vedānta agree on the point that the world is an illusion' (1991: 336). However, whether quantum physicists themselves have endorsed such metaphysical implications is a deeply contested matter. While Einstein and Max Planck vigorously resisted the notion that the physical world is dependent on the human mind, other founding figures such as Wolfgang Pauli and Erwin Schrodinger, both of whom incidentally had been influenced by Schopenhauer, were more willing to speak of consciousness within the framework of quantum mechanics. (Marin 2009). However, regarding E. Wigner's proposal that it is the human observer as a conscious being who 'collapses' the wave-function, E.R. Scerri (1989: 689–90) notes that this is 'something of a minority view, despite Wigner's eminence in the quantum world'. Further, the consciousness that Wigner speaks of is ordinary consciousness that operates through sensory channels, and not the deep meditative states of higher consciousness of some Indic mysticisms. A. Shimony provides a cautious route through these conceptual minefields by indicating that a solution to the 'measurement

problem' might involve radical restructurings of our understanding of physical reality, including, for instance, the attribution to consciousness the power to actualise specific possibilities. He notes: 'Whatever the outcome of our present uncertainties may be, it is sure to be philosophically significant. Those who have deplored the rift between science and philosophy which began to develop in the eighteenth century may take comfort in the mutual relevance of these disciplines exhibited in the foundations of quantum mechanics' (1989: 395).

Modern Advaitic visualizations of subatomic phenomena usually go significantly beyond this statement of 'mutual relevance' and argue that quantum physics is, in fact, deficient in that it cannot, in itself, lead individuals to the metaphysical absolute. Swami Jitatmananda argues that scientists cannot move beyond the boundary conditions of their physical equations, for the eternal substratum, Brahman can only be apprehended through a higher intuition which goes beyond reason but does not contradict reason (2006: 77). Panda argues, in this vein, that his primary goal is to develop a 'fusion' of Advaita Vedānta and quantum mechanics, where Advaita is reinterpreted in the light of modern science, and the 'deficiencies of modern science have been made up by the supplementation of Advaita Vedānta' (1991: xiv). The crucial claim underlying the positions of Swami Jitatmananda and Panda is this: while quantum physics can be a limited pointer towards the 'things in themselves', its theoretical formulations are largely confined to empirical entities and processes, and only Advaita Vedānta can truly direct individuals towards the transcendental Brahman which underlies the phenomenal world. In other words, the proposed correlations between certain aspects of quantum mechanics and modernised configurations of Advaita, for instance, the deep entanglement across quantum phenomena and the Advaitic notion of an undifferentiated unity, are being offered from the transcendental vantage-point of the eternal Brahman.

Therefore, the 'science' in modernised Advaita Vedānta is to be understood ultimately in terms of an Upaniṣad-based gnosis of one's deep non-duality (*advaita*) with Brahman. This gnosis is often inflected, in the 'neo-Advaita' of Hindu figures such as Swami Vivekananda, with the vocabulary of 'experience' so as to present it as scientific. A. Rambachan has pointed out that Swami Vivekananda presented the Vedas to his western audiences as containing spiritual laws which were similar to the laws of nature. The Vedic scriptures are a repository of the spiritual experiences (*anubhava*) of gifted human beings, who are able to verify these laws through a direct apprehension and not a mere study of the texts (1994: 60). For instance, Swami Vivekananda notes that a scientist does not offer a statement to be accepted unless it has been tested by experience, and likewise the existence of the divine is grounded in direct perception: 'The proof of this wall is that I perceive it. God has been perceived that way by thousands before …' However, he acknowledges at once that what he has in mind here is a specific form of yogic consciousness: 'But this perception is no sense-perception at all; it is supersensuous, superconscious …' (Vivekananda 1992: vol. 1, 415). S. Radhakrishnan, in a similar manner, often spoke of the 'experimental basis' of Hindu philosophy (*darśana*), which leads an individual to a direct insight (*anubhava*) into the nature of reality. A fundamental difference between Radhakrishnan and the classical systematiser of Advaita, Śaṃkara (*c.*800 CE) is that whereas the latter grounds the self-certifying nature of intuition (*anubhava*) ultimately in the authority of scripture and exegesis based on it, the former reverses this order of priority. Radhakrishnan instead argues that this 'experience', which provides its own justification and which does not, in addition, violate the canons of rationality or make appeals to unique revelations, is also found to conform to the Vedic scriptures. Radhakrishnan's attempt to disjoin this mode of spiritual apprehension from scriptural tradition has been read in terms of his valorization of 'science' as providing

universal access to truth and of the authority of 'experience' over that of tradition (Forsthoefel 2002). Thus Radhakrishnan's neo-Vedanta presents Hinduism as the religion based on the spiritual experiences of the Vedic seers as recorded in scripture, and these experiences have to be reconfirmed by individuals in their own consciousness. These Vedic truths are 'capable of being re-experienced … By experimenting with different religious conceptions and relating them with the rest of our life, we can know the sound from the unsound' (Radhakrishnan 1927: 15). The appropriation of certain scientific dimensions from Hindu metaphysical perspectives also structures several modern Vedantic engagements with neo-Darwinian evolution. The conflict between the non-teleological character of neo-Darwinian evolution, which operates through random genetic mutation and natural selection, and the teleological emphasis of Hindu notions of spiritual progress is removed by positing the former as a biological means which can partly assist the perfection of the latter. A crucial distinction between the two is that in Vedantic metaphysical systems, the spirit (*puruṣa*/*ātman*) is the origin and the foundation in the spiritual evolution, and not the product, of the physical universe (Killingley 1990: 165). Therefore, some of the pivotal figures of modern Hinduism, such as Keshub Chandra Sen, Swami Vivekananda, Aurobindo and others were able to accept the organic evolution of Darwinism at a lower level of truth, by placing it below the higher level of the spiritual manifestation ('evolution') of humanity (Brown 2012: 613). For instance, Swami Vivekananda argued that while westerners have their theory of evolution in terms of the survival of the fittest, the classical Indian yogis such as Patañjali had a superior understanding in terms of the refinement of material nature to allow the manifestation of the true self (Vivekananda 1992: vol.6, 45).

Science and its Metaphysical Foundations

To summarise our argument so far, the question of whether the philosophical/experiential content of Mahayana Buddhism and Advaita Vedānta can be regarded as 'scientific' is related to ongoing disputes over whether or not the scientific enterprise is beset with some internal inadequacies which can be remedied by the metaphysical horizons of these eastern spiritualities.

Christian theologians have sometimes claimed in this regard that scientific results underdetermine metaphysical theories, that is, more than one theory can incorporate these results. A theological reflection on the sciences can explain the gradual emergence of self-conscious, personal and moral beings with the capacities for scientific inquiry and spiritual transformation. For instance, J. Polkinghorne writes that various contemporary disciplines such as cosmology and the biological sciences often throw up questions which are not properly scientific but meta-scientific, and he offers a 'theology of nature' as one such meta-interpretation of the world that is disclosed to us through these disciplines. While 'natural theology' sought to argue deductively from certain features of the world to God, a 'theology of nature' is instead a theistic exploration, in the light of divine revelation, of how the creative purposes are being worked out through the complexities of the evolving universe (Polkinghorne 1998: 77–78). The basic theme here is that Christian doctrine can provide certain kinds of 'confirmation' for scientific theories: for instance, Christian theologians might argue that the doctrine of a creator God helps to make sense of the existence of a stable rational order that the scientific disciplines seek to investigate (Stenmark 2010: 282–84). The key challenge in these theological investigations into the foundations of the natural sciences is to spell out the relations between scientific inquiry and Christian doctrine such that the

latter illuminates the former without violating its cognitive autonomy and methodological integrity. More precisely, the challenge is to negotiate possible oppositions, contradictions or conflicts between these two domains, so that the results of science are somehow seen as a reflection of the creator in the natural world (Barbour 2000). Consider, for instance, the three models of divine action, discussed by A. Jackelén, which do not involve God's direct intervention in natural causal processes. First, there is the deistic picture of God who creates the world but is not continuously involved in its sustenance. According to the second, God works through primary causality at a level which is distinct from the level of secondary causality which operates across natural phenomena. Jackelén notes that while scientists cannot disprove the existence of primary causality, it is irrelevant to their understanding of natural phenomena. Third, a set of models which she labels 'entangled divine action' places God within the framework of an indeterministic natural web that is studied by the sciences such as quantum physics and evolutionary biology. However, even these approaches ultimately result 'in an ambiguous openness: The eye of faith may see final causality, that is, ultimate purposes that pull the cosmos towards its final *telos*, and science can neither confirm nor deny such claims' (Jackelén 2012: 141). In other words, the move from the natural sciences to a Christian theological reflection on these sciences is not a 'deductive step'; rather, it is from the perspective of Christian faith that one may begin to see the natural world as imprinted with signs of divine presence.

Some of these conceptual problems also emerge in the contemporary Hindu attempts to 'integrate' the natural sciences into Vedantic metaphysical horizons. The underlying strategy in these assimilations of science to Vedantic Hindu universes is to claim that the empirical details of the sciences can be illuminated by being absorbed into certain Hindu metaphysical perspectives, a claim which leads to the question of whether such incorporations will not

generate conceptual conflicts between the two (Brown 2007: 442). When Swami Vivekananda (1992: vol.5, 519) claimed, 'Knowledge is to find unity in the midst of diversity – to establish unity amongst things which appear to us to be different from one another', the fundamental question is the kind of unity that is indicated. The *Brahma-sūtras*, a set of foundational aphorisms for all Vedantic systems, begin by stating 'therefore, then, the inquiry into Brahman (the ultimate reality)' (*athāto brahma-jijñāsā*). While such a Vedantic inquiry is similar in some respects to that of scientists in the fields of, say, astrophysics or quantum mechanics, the ultimate reality (Brahman) indicated by the Vedantic traditions is not accessible to ordinary reason. Again, while sciences such as physics seek to understand the temporal evolution of the cosmos through natural laws, certain forms of Vedānta such as Advaita instead view all cosmic processes as ultimately illusory appearances (*māyā*) out of the eternal ground of Brahman. Therefore, since both science and Vedantic systems are, in principle, unifying systems of knowledge, the ontological commitments in the 'unity' proposed by the former may conflict with those in the 'unity' projected by the latter. For instance, while neo-Darwinian evolutionary biology usually rejects matter-spirit dualisms, and argues for consciousness as an emergent property of physical structures, modern Vedantic reflections on evolutionary biology regard spirit as (ontologically or logically) independent of materiality. Consequently, these Vedantic illuminations of neo-Darwinian evolution proceed by redefining the basic terms involved: the Vedantic doctrines are regarded as 'evolutionary' in the sense that they teach the progressive unfolding of natural phenomena under the guardianship of the spirit, whereas Darwinian evolution is said to be anti-spiritual and limited only to the biological emergence of the species. Similarly, when Keshub Chunder Sen (1901: 405) argued that between God-vision and the spirit of science there was no discord, but rather concord because scientists too 'ardently love unity', what he had in mind was a specific kind of Vedantically-inflected unity of being (1901: 409). Therefore, more

recently, after noting certain parallels between concepts in quantum mechanics and classical Vedantic metaphysics, V.V. Raman cautiously argues that we should 'resist the temptation of equating interesting conceptual parallels with ontological or epistemological equivalence' (2011: 162). Raman, in fact, argues that Vedanta should be distinguished from science because while scientific inquiry is concerned with analysing the empirical details of a transient world, Vedanta is aimed at the realisation (*anubhava*) of the transcendental ground of the physical universe (2002: 87).

Science and its European Origins

Our analysis in preceding sections indicates that 'scientific' credentials are often claimed for the eastern religions on the grounds that they are based on experience, involved in a quest for unity, and so on. However, the natural sciences, which too are based on empirical observations and often pursue systematic conceptual unification, are also structured by some basic concepts and practices such as experimentation, falsification of theories, quantification, and so on (Engler 2013: 422). Some of these aspects are captured in E.O. Wilson's definition of science as the 'organized, systematic enterprise that gathers knowledge about the world and condenses the knowledge into testable laws and principles' (1998: 58). We could unpack this definition by understanding 'science' as a field of activities which is circumscribed by certain norms relating to the production, transmission and exchange of knowledge. It is an enterprise carried out by individuals ('scientists') who are in active communication, meeting at conferences or reading one another's hypotheses in scientific journals. The messages that are transmitted among scientists are written in a language which can be understood universally, the favored language in many of the sciences being mathematics. The aim of this transference is the attainment of the maximal degree of consensus among scientists, who

should be able to reproduce the results proposed by the theory through the design of certain experiments carried out under controlled conditions. Through these processes, a 'paradigm' of inter-related and coherent theories is gradually built up. A scientific paradigm is a web of inter-related problems, methods, and practices, and scientists belonging to a certain paradigm form a group of communicating enquirers who explore the world in the light of this paradigm (Kuhn 1970). To become a scientist an individual has to accept certain statements that she is not in a position to immediately test or verify without further training. For example, within the Newtonian paradigm, one must first accept the validity of Newton's three laws of motion, and the same applies for other paradigms in the fields of microbiology, cosmology, relativity theory and so on (Ziman 1984). Science, in other words, is an ongoing inter-subjective process in which messages flow into archives where they can be preserved, understood, criticized, (sometimes) verified and (sometimes) falsified by the community of competent scientists which is recruiting and training novices. At the same time, one should not emphasise a particular set of experimental methods or theoretical principles as necessary criteria for a field to be recognised as 'scientific' for, as J. Dupre (2004) has pointed out, the different scientific disciplines such as physics, chemistry, biology, psychology, and so on have their specific concepts and methodologies, and there is no single scientific method that applies across these fields. Further, the meanings of 'science' have shifted, in some ways drastically, across the European centuries: thus, in medieval and early modern Europe, *scientia* was understood largely in terms of logical derivations, whereas in the seventeenth century 'natural philosophy' encompassed our present-day disciplines of astronomy, physics, and so on. As P. Harrison (2011: 28) points out, science as a modern academic discipline, along with a specific kind of scientific professionals and a general consensus on specific themes to be excluded, emerged sometime in the first part of the nineteenth century. Languages such as German still do not sharply distinguish between 'science' and

'philosophy', characterising both these academic disciplines and enquiries as *Wissenschaft* (knowledge).

These definitional ambiguities indicate why the supposed connections between theological horizons and empirical sciences remain a disputed matter in the literature on the Christian roots of science (Sivin 1982: 56). R. Gruner argues that even though it is true that there are some continuities between modern science and medieval Christian worldviews, it would be incorrect to postulate any historical necessity connecting the former with the latter. He criticizes such a necessitarian claim on the grounds that for around 1500 hundred years, science did not emerge in Europe, and since the eighteenth century it has often been viewed, in fact, as radically opposed to religious doctrine. According to him, the claim that modern science has developed from Christianity is 'at best a very shorthand description of a very complex historical event … Science did *not* grow out of this religion as an oak tree grows out of an acorn. For there is nothing natural, predestined, logical about historical development' (Gruner 1975: 81). While accepting that Christian commitment has provided many scientists with great stimulus for scientific work, he criticizes the view that such adherence is a 'necessary precondition' for scientific inquiry. More recently, P. Harrison has argued that the reason why there were more Protestant than Catholic scientists in early modern Europe is that Protestants encouraged believers to read the Bible for themselves in non-allegorical ways and without the control of ecclesiastical authorities. This literalist approach to Biblical texts was sometimes carried over by them to the study of the world in terms of naturalistic forces and to an active engagement with it in the attempt to restore it to its Edenic perfection. Therefore, this approach to the texts which was 'driven by the agenda of the reformers and disseminated through Protestant religious practices created the conditions which made possible the emergence of modern science' (Harrison 1998: 266). However, Harrison is careful not to

argue that Protestant hermeneutics of the Bible or the Protestant Reformation was the sole cause behind the emergence of science, but rather that these played a crucial role in the process by promoting certain attitudes and values that intersected with various contingent historical forces.

The definitional shifts that we have noted should be kept in mind when one employs the vocabulary of 'Vedic science', Hinduism or Buddhism as 'science-friendly', 'Vedantic science of consciousness', the 'meeting' of Hinduism and science, the 'scientifically-proven' quality of Buddhism, and so on. R.H. Jones argues in this connection that certain comparisons which have been proposed between western scientific methodologies and assumptions, on the one hand, and forms of eastern mystical experiences, on the other hand, obscure various methodological questions about how the key terms are understood. He notes that these juxtapositions are often of these types: '"if two systems have some features in common, they are identical'" or '"if *A* and *B* see the world differently than do most people, then they see it the same way'" (1986: 172). While certain Vedantic doctrines would indeed count as scientific if 'science' is understood primarily in terms of a search for conceptual unity, a quest for metaphysical foundations, a system of knowledge acquisition that is receptive to experiential claims, and so on, these doctrines would sharply conflict with other notions associated with contemporary science such as mathematization of natural processes, formulation of fallible hypotheses, instrument-based experimentation, and so on. Given that science operates with methodological-institutional mechanisms for rejecting certain 'traditional' ways of apprehending the world, a theme that has been intensely debated in 'Science Studies' is whether the denial of a 'scientific' status to certain eastern forms of 'alternative science' is a Eurocentric move based on the claim that European science is the only universally valid metanarrative. For the proponents of 'Science Studies', there is no

transcultural essence to the enquiries and practices called science; rather, we should adopt a conceptual egalitarianism or conceptual relativism according to which diverse ways of configuring our relations to the world are accepted as reasonable and valid. Our concepts of space, time, causality, and so on are shaped by our social contexts, and there is thus an irreducible plurality of knowledge systems across which there cannot be any translations through the principles of logic, rationality, and so on (Brown 2001). All notions of universalist logic, truth, rationality, and so on should be rejected because the very appeal to such universality is said to be a specifically European hegemonic claim.

Our discussion has indicated that figures such as Swami Vivekananda and the Dalai Lama would themselves reject this critique if it were applied to the case of eastern spiritualities: they view their specific metaphysical-soteriological claims (the eternity of the Vedantic *ātman* for the former, and Buddhist insight into emptiness for the latter) not as confined to Indic or Tibetan horizons but as universally applicable. Further, they have critically appropriated at various registers certain aspects of the empirical sciences, which they have sought to encompass within their spiritual horizons which are offered as trans-culturally valid. Therefore, the critique is usually understood in the field of science and eastern religions not as a statement of strong incommensurability which rejects all notions of universality, but as an indication that we should welcome alternative eastern epistemic styles as plausible, meaningful, and revelatory of aspects of reality, for these styles may be able to integrate third-person objective views of the universe into intuitive, meditative, and relational worldviews (Dorman 2011: 616). Thus A.N. Balslev argues that ‘the story of science in India is not confined only to the two hundred years of assimilation of the Western system of knowledge. India has experience with centuries-old knowledge systems that we all need to tap into. Some of these knowledge traditions in various domains have been continuously

utilized, and some are waiting to be revitalized, as these are seen to be able to provide alternatives to the current hegemony of mainstream science' (2015: 890).

Therefore, recent histories of the global circulations of science have critiqued certain diffusionist historiographies which present it as a uniquely western configuration that has been transmitted to south and southeast Asian peripheries to counter irrational beliefs and practices. They have emphasised that science entered into complex negotiations with local systems of knowledge, and was adapted in diverse ways into indigenous classifications (Arnold 2000). Various forms of modern Buddhisms, with their emphases on experience, rationality, and social activism, emerged in contexts of response to and engagement with the claims of Christian missionaries and colonial administrators that only western worldviews were scientific (Lopez 2010: 890). At the World's Parliament of Religions in Chicago 1893, a pivotal moment in this narrative, Anagarika Dharmapala subsumed Darwinian evolution and the law of cause and effect into the Buddhist teaching of dependent origination (*pratītya-samutpāda*), and claimed that western scientific notions had been anticipated by the Buddha. He appropriated the western Orientalist presentations of an ideal 'textual Buddhism', which was carefully distinguished from the ritual practices of 'living Buddhism', as well as the positive images of the Buddha developed by European figures such as H.S. Olcott of the Theosophical movement, both to oppose Christian missions and to revitalise Buddhism against the charges that it was nihilistic, pessimistic, and superstitious. Thus, at a talk in New York, Dharmapala claimed: 'The message of the Buddha that I bring to you is free from theology, priestcraft, rituals, ceremonies, dogmas, heavens, hells and other theological shibboleths. The Buddha taught … a scientific religion containing the highest individualistic altruistic ethics, a philosophy of life built on psychological mysticism and a cosmology which

is in harmony with geology, astronomy, radioactivity and reality' (McMahan 2004: 906). Olcott himself was a crucial figure in developing the 'scientific image' of Buddhism, aligning some of the classical Buddhist teachings with contemporary notions such as the law of causality. According to his *Buddhist Cathecism*, which was used in Buddhist Sunday schools in Sri Lanka, the state of the future rebirth of an individual is controlled by karmic merit and demerit, and the 'true science' of evolution 'entirely supports this doctrine of cause and effect. Science teaches that man is the result of a law of development, from an imperfect and lower, to a higher and perfect, condition' (1881: 11).

On some occasions, Dharmapala sought to accentuate the 'scientific' status of Buddhism by placing it in opposition to 'Semitic religion' which is said to lack a scientific foundation: 'With the spread of scientific knowledge, Christianity with its unscientific doctrines of creator, hell, soul, atonement, will be quite forgotten. With the expansion of knowledge Europeans may come to know more of evolution, of the laws of causation, of the changing nature of all phenomena … then will Buddhism meet with a sympathetic reception' (McMahan 2004: 923). As D.L. McMahan notes, the early discourse of scientific Buddhism was intertwined with the missionary representations of Christianity: on the one hand, the reconfigurations of Buddhism drew upon the Protestant emphases on textuality, individual experience, and so on, but, on the other hand, these modernized Buddhisms were negations of aspects of Christian doctrine which skeptics and liberal Christians had found problematic. Thus, Buddhism did not believe in the capricious creation of the world by a personal God, it affirmed the universal law of causation, it encouraged individual experimentation rather than blind dogma or faith, its doctrine of *karma* anticipated evolutionary theory, and it had no teachings of eternal hell and miraculous interventions (2004: 924–25). The centrality of scientific vocabulary has been highlighted also in Japanese Zen which was shaped by

Japanese intellectuals such as D.T. Suzuki (1870–1966) who sought to 'rationalise' Japanese Buddhism, to respond to the Enlightenment critique of institutionalised religion and also to the condemnation in the Meiji period (1868–1912) of Buddhism as a corrupt, anti-social, and superstitious belief system. The proponents of this New Buddhism claimed that Zen is not a religion in the institutional, ritual or clerical senses, but is an 'uncompromisingly empirical, rational, and scientific mode of inquiry into the true nature of things' (Scharf 1995: 248).

Conclusion

The application of the label 'science' to a knowledge system from an era predating the Scientific Revolution, whether in European or non-European locales, turns out to involve varying degrees of continuity and discontinuity. G.E.R. Lloyd points out that while there was no 'modern science' in ancient civilizations such as Mesopotamia, India, or China, they often conducted forms of systematic enquiry and accumulated data in various fields such as astronomy, medicine, and so on. After noting that these inquiries might be written off as anti-scientific by contemporary scientists on the charge that they were not structured by causal explanations but were grounded in postulated associations between things, he makes the following observation: 'If, in the latter case, many moderns would be tempted to be dismissive, we need to be reminded that establishing the similarities between things is an essential element in classification and taxonomy in the earth sciences, for example, as well as even more obviously in zoology and botany' (2013: 41). Therefore, the inquiry 'what is the science in eastern religions?' can also, in effect, assist methodological inquiries in philosophy of science into 'what is science anyway?'

The intellectual developments, in ancient and medieval India, in the fields of astronomy, medicine, mathematics, and so on indicate a concern with grounding knowledge claims in experience, even if these claims were not tested or falsified in terms of current scientific practice involving experimentation, institutionalised peer review, and so on (Subbarayappa 2011). One should note in this context that the classical Indian standpoint of the Cārvākas rejected all beliefs in supernatural entities, and claimed that the universe has evolved through the intrinsic causal potencies (*svabhāva*) of its basic elements. Again, classical Indian epistemology was centred around the notion of proof (*pramāṇa*), and syllogistic patterns of reasoning had to proceed by way of supplying evidence in support of the proposed conclusion (Ganeri 2001). However, certain forms of modern Vedantic Hinduism, drawing upon classical scriptural texts and commentaries, also posit a form of 'higher' insight (*parā-vidyā*), which is a non-discursive form of knowledge beyond knowing, and which transcends the 'lower' empirical sciences (*aparā-vidyā*). At this point the conflict between Vedantic knowledge and scientific claims becomes particularly acute, because the latter operate within methodological constraints that do not admit trans-empirical entities, states, or processes. For an instance of a potential conflict, one can turn to Swami Vivekananda's proposed combination of heredity, which applies at the level of the biological generation of the body from parents, with the spiritual processes of the reincarnation of a non-physical self: 'Our theory is heredity coupled with reincarnation' (Vivekananda 1992: vol.2, 441). While he claimed that science is the quest for unity, and that once science reaches 'perfect unity, it would stop from further progress, because it would reach the goal' (vol.1, 14), the key point is the content of the 'science' which will have reached complete explanatory scope. Therefore, the claim that eastern spiritualities can provide holistic 'integrations' of the natural sciences can conflict with some of the principles of these sciences, especially if these spiritual horizons include vitalism, parapsychology, astrology, and so on, whose scientific status has

usually been strongly denied. The debate over the presence or the absence of 'science' in eastern spiritualities is ultimately a debate over the metaphysical frames – or anti-metaphysical stances – within which the everyday business of the empirical sciences are placed.

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