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## The science of the self (*ātmaśāstra*): the reconfigurations of Vedāntic gnosis in Hindu modernities

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### ABSTRACT

A distinctive claim of some of the configurations of 'modern Hinduism' is that ancient Vedic wisdom foreshadows some contemporary scientific and technological advances, or provides us with a spiritual framework within which the current empirical sciences can be encompassed. I discuss some of the hermeneutic strategies employed by Swami Vivekananda, S. Radhakrishnan, Swami Prabhupada, and others as part of their imaginations of Hinduism as a 'scientific religion', which is geared towards the spiritual perfection of humanity. Many of these figures appropriated a classical Vedāntic Hindu distinction between 'lower' and 'higher' knowledge, and mapped it onto the distinction, inflected by colonial power, between 'western science' and 'Vedic/ yogic wisdom'. Whilst for some classical thinkers, this distinction applied to the disjunction between the 'lower' pathway of ritual action and the 'higher' pathway of insight into the Self, Vivekananda and others reformulated it in terms of the difference they proposed between, on the one hand, the empirical processes of the natural sciences and, on the other, the liberating efficacy of self-knowledge. I examine three key aspects of this mapping: the semantic ranges of 'science' in some western and Hindu traditions, the Orientalist milieus of colonial India in which these translations were developed, and the conceptual instabilities of the hybrid trope of 'Hindu science'.

### KEYWORDS

Vedic science; Swami Vivekananda; S. Radhakrishnan; Swami Prabhupada; science studies

A central theme in the academic study of Hinduism in recent decades relates to the dense negotiations between western modernity and indigenous structures of thought and practice in late colonial India. Scholars from diverse perspectives ranging from postcolonial theory, intellectual history, social anthropology, translation studies, feminism, and others have highlighted, sometimes in painstaking detail, the complex oppositions to, as well as the appropriations of, certain western frameworks in the colonial zones of contact. A crucial aspect of these east-west encounters is the employment of the vocabularies of 'science' by some modern Hindu figures who sought to present Vedāntic wisdom as the 'science of the self' (*ātmaśāstra*), where the spiritual truths intimated by the Sanskrit scriptures could be subjected to empirical verification. The hybrid trope of 'Hindu science', representing the attempts to reconfigure Vedāntic technologies of the self (*ātman*) through an appeal to the cognitive and social authority of science, however, encompasses various oppositions, overlaps, and shifts between the methodologies of western scientific empiricism and the 'Vedic science' of self-realisation. I will discuss how the notion of Hinduism as the 'science of the self' was shaped by some modern Hindu figures such as Swami Vivekananda (1863–1902), Sarvepalli Radhakrishnan (1888–1975), and A.C. Bhaktivedanta Swami Prabhupada (1896–1977). I will reflect on these attempts to interweave

scientific notions into Vedāntic fabrics in the light of the crucial debates, from the perspectives of the history and the philosophy of science, relating to attempts to define 'science' and demarcate a 'scientific' field of enquiry from other cognitive practices.

## Hinduisms on the horizons of science

Modern apologetic Hindu interrogations of and engagements with European worldviews sometimes involve the claim that there is a deep resonance, harmony, or consilience between Hindu teachings and science. As we will note throughout this essay, these historical claims are, in fact, imbricated in dense conceptual disputes over how to, or whether it is even possible to, precisely demarcate the disciplinary boundaries of 'science' from the cognitive-experiential-affective dimensions of 'religion'. To begin with Newton, his 'scientific' work is a complex interweaving of Christian 'metaphysical' beliefs with a mathematical unification of celestial and terrestrial mechanics, such that his understanding of space and time is integrated with his 'theology' of divine action in the world.<sup>1</sup> Alerting us to the specific historicities of these terms in European contexts, Peter Harrison argues that it is only from the second half of the nineteenth century that 'science' and 'religion' began to be posited at times as two reified entities which have existed throughout history in a state of perennial warfare. In medieval and early modern Europe, *scientia* was understood largely in terms of logical derivations within an Aristotelian cosmology and theological wisdom (*sapientia*) was the integrative vision that would orient humanity towards the Christological eschaton. Consequently, Harrison notes that if we apply the term 'science' to the Greeks or the medievals, we should keep in mind that it bears only a 'loose genealogical relationship' to its contemporary senses.<sup>2</sup> Later, during the seventeenth century, the term 'natural philosophy' encompassed our current disciplines of astronomy, geology, physics, and so on, which began to be professionalized and systematized under the umbrella of 'science' as academic disciplines only after the 1850s in British universities. The current sciences themselves encompass a wide array of fields with somewhat distinctive styles of enquiry, so that there may be greater differences *between* specific sciences than *between* one science and a non-scientific discipline such as theology. As Harrison points out: 'That cosmology and quantum physics in recent times have been grist to the mill of theologians says less about some general relationship between science and religion than it does about the proximity of these sciences to the border with theology'.<sup>3</sup> For instance, one reason why string theory, and some other theories in high-energy physics such as cosmic inflation, have become intensely debated fields in scientific circles is because they are being actively developed even in the lack of their empirical confirmation or experimental testability.<sup>4</sup> Therefore, approaches to the rubric of 'science and religion', which posit their relationships in terms of mutual harmony or straightforward conflict can be hasty generalizations based on definitions of 'science' and 'religion' which are 'essentialist, anachronistic, or unhistorical'.<sup>5</sup>

Notwithstanding these context-sensitivities that historians of science have highlighted in recent decades, both British administrators and Christian missionaries on Indian colonial landscapes often projected their European 'science' as a civilizing force in milieus which they regarded as uniformly saturated with 'religion'. From the perspectives of the British utilitarians, 'science' was one of the many signifiers of their cultural difference from the natives and symbolic of the 'order' which they sought to establish in the midst of the 'chaos' which they struggled to negotiate efficiently. Therefore, whilst the rhetoric of science was part and parcel of their mission of improvement through the networks of railways, roads, and the telegraph, they usually refused to accept Indians as their equals in matters of scientific competence. As David Arnold has noted,

Indian scientists often had a more positive reception in London, Edinburgh, Berlin or Stockholm than they received in their own country at the hands of the white scientific and medical establishment. In science, technology and medicine, denial was as important as dissemination ...<sup>6</sup>

Arnold therefore criticizes the diffusionist understandings of the history of science in colonial India according to which the spread of scientific notions and technological advance took place in a largely one-directional manner in which European modernity uprooted indigenous traditions. Indian scientists such as Jagadish Chandra Bose and Prafulla Chandra Ray often developed patterns of complex interweaving between European science and traditional biological and medical systems, and made highly significant and internationally acclaimed contributions in the fields of physics, chemistry, and mathematics.<sup>7</sup>

For many British Christian missionaries too, the trope of 'science' was implicated in their visions of progress, which was to be characterized by the spiritual regeneration of the fallen Hindu soul through the salvific light of Christianity. Scottish missionaries such as Alexander Duff (1806–1878) in Calcutta viewed western science as the rational instrument whose partial truths could free Hindus from their superstitious pasts, mythological fancies, and fatalistic beliefs, and prepare them for the reception of the fullness of Christian truth.<sup>8</sup> Given his conviction that science, the 'record and interpretation of God's visible handiworks', would undermine the monumental system of Hinduism, Duff asked missionaries joining his school to convert 'every fact, every event, every truth, every discovery, into a means, and an occasion of illustrating or corroborating sacred verities'.<sup>9</sup> The corrosive effect, which western science was projected to inflict on Hindu cognitive structures and social milieus, was depicted dramatically by Sir George Trevelyan (1838–1928) in these terms:

The most effective spell with which to exorcise the demons of the Hindoo mythology is physical science. A native who has taken the degree of Doctor of Medicine, or who has learnt at the [Calcutta] Presidency College all that can be taught him by a crack Cambridge Wrangler, must regard the astronomy and geography of his old religion with a contempt which will very soon include that religion itself.<sup>10</sup>

Nevertheless, matters on the ground did not always proceed smoothly, and the introduction of science produced a new generation that was sharply iconoclastic and sceptical of *all* religious beliefs. Currents of rationalism and 'free-thinking' circulated amongst the Bengali intelligentsia in the late nineteenth century, and the writings of figures such as Tom Paine, August Comte, and John Stuart Mill were plundered for intellectual resources in developing oppositional stances both to the indigenous traditions and to the Christian missionaries. Akshaykumar Datta (1820–1886), for example, argued that the Kaṇāda and the Vaiśeṣika systems of classical Indian philosophy were superior to the others for they postulated no creator God but explained all natural phenomena through the interactions between atoms. Such notions, however, were in the course of time embroidered with fanciful beliefs, and to clear through the falsities that clustered around them, Indians 'were in want of someone to lead them. They were in need of one Bacon, one Bacon, one Bacon'.<sup>11</sup> In this vein, Ishwar Chandra Vidyasagar argued that through the study of European philosophy his students would be enabled to expose the falsities of the classical systems of Vedānta and Sāṃkhya, though this philosophy had to be the *Logic* of Mill and not the idealism of Berkeley.<sup>12</sup>

Some of these complex debates that ensued in the triangular contests between Christian missionaries, proponents of refurbished versions of Hindu thought, and traditionalist critics of these developing Hindu modernities revolved around the theme of 'experience' and its epistemic locations in religious universes. The emergence of missionary societies such as the Baptist Missionary Society (1792), the London Missionary Society (1795), and others was a constitutive aspect of the different strands of 'Evangelicalism' that spread through England from the middle of the eighteenth century. Though many Evangelicals were opposed to the Enlightenment's emphasis on reason, and particularly the Deists' rejection of revealed religion, David Bebbington argues that certain Enlightenment assumptions such as the application of the Baconian inductive method were assimilated into their theology. Not only were Evangelicals often familiar with the thought of Locke and Newton, but also a significant number of them, including John Wesley, could talk about 'experimental religion'. This was the time when natural theology was enjoying its heyday and Evangelicals, who believed that the ordered structures of the universe were the creation of God, were convinced that they could find vestiges of the divinity in intricate designs and

patterns which were harmoniously arranged by their Maker.<sup>13</sup> Their theological confidence in human reason as a pointer towards God was sometimes reflected in Christian missionaries in India who sought to provide empirical bases for the truth of Christianity, with the hope that once Hindus were compelled by the evidential force of their demonstrations they would accept specific doctrinal claims about Christ.<sup>14</sup>

The narratives of Hindu socio-religious reform movements are structured partly by interrogations of the missionary view that the rational forces of western science would propel Hindus towards the light of saving Christian truth. The Hindu reformers often drew on the criticisms levelled at traditional beliefs and institutions by the Christian missionaries, as well as some of the radical nonconformist views circulating in Europe, to forge distinctive strategies for confronting and eradicating what they perceived to be the excrescences of Hinduism. Much to the consternation of the missionaries, these reformers developed arguments from European figures such as Voltaire who had excoriated the Catholic Church as a tyrannical, magical, and corrupt institution. A group of social reformers associated with Anglo-Marathi newspapers such as the *Darpan*, started by Bal Shastri Jambhekar in 1832, and the more radical *Prabhakar* in 1841, accepted the missionary arguments about the degeneration of Hindu society from its pristine values enshrined in the Vedas; developed the Deist view that the 'universal religion', freely accessible to all morally upright beings, transcended the 'dogmatic' bounds of Christianity; and strove for the social emancipation of the lower castes and women.<sup>15</sup> Some decades later, in the Punjab, the Arya Samaj began to claim that ancient Vedic civilization had attained a high level of technological sophistication, and possessed electricity, steam engines, and aerial vehicles.<sup>16</sup> Thus, 'science' became a highly contested site of opposing constructions: whilst Christian missionaries could speak of the dissolutions of Hindu mythology through western empiricism, Hindu reformers often countered such claims by marshalling the resources of empiricism and technology for the service of a 'scientific' Hinduism.

### Hindu modernities and the category of 'experience'

The notion of a 'universal religion' that would be grounded in experience and the laws of nature, opposed to clerical dogmatism and scriptural orthodoxy, and emblematic of the arrival of humanity at the next stage of spiritual advancement began to assume a pivotal role in the attempts of some Hindu modernizers to re-envision the classical Hindu scriptures in the conceptual spaces opened up by European science. By the middle of the nineteenth century, members of Debendranath Tagore's Brahmo Samaj began to speak of the natural laws structuring religion, which could be uncovered through a 'non-sectarian' investigation into the historical religions of the world.<sup>17</sup> Tagore himself had taken the decisive step of moving away from the doctrine of Vedic infallibility, stating that in the matter of accepting Vedic and Upaniṣadic passages one had to rely on the 'pure heart, filled with the light of intuitive knowledge', and reject those scriptural texts which were not in accord with such a heart.<sup>18</sup> Commenting on a verse from the *Mundaka Upaniṣad* I.1.5, Tagore argued that the 'highest science' was that through which God could be realised via intuition, and this knowledge of God was the crown of the inferior sciences such as astronomy, geology, medical science, philosophy, and so on.<sup>19</sup> Keshub Chunder Sen, who split from the sagely Tagore to form his own group in 1866, was a highly charismatic leader, and he continued to emphasize the role of inspiration, experience, and intuition in human pathways to the divine. After meeting Sri Ramakrishna in 1875, whom he introduced into Brahmo circles, Sen began to withdraw from his earlier active involvement in social reform and claimed that he had received direct messages from God.<sup>20</sup> Foregrounding 'experience' in Hindu universes in a lecture delivered in 1875, Sen highlighted the Hindu's 'spiritual perception' in these terms: 'The great question in which all Hindu devotees are anxiously interested is whether the soul has seen the Lord. Have you perceived Him? is what they ask each other'. Their understanding of the divine is based not on abstract ideas but on 'direct and intuitive knowledge': they see God 'as a present Reality, a living Person, with the mind's eye'.<sup>21</sup> This increasing spiritual turn was concurrent with

the development of a highly eclectic 'New Dispensation' (*Nava Vidhan*), which Sen proclaimed in 1880 was the third dispensation after the first two dispensations of God through the Old Testament and the New Testament.<sup>22</sup> The new synthesis would harmonize 'faith' with 'science', and Sen could on occasion employ scientific vocabulary to speak of the promised unity of all truths in terms of the emergent product of a chemical combination:

Bring hydrogen and oxygen together, they will not unite until you pass a spark of electricity through both. In the same way the mere collection of other religions will not make them unite, but the fire of heaven, the Divine inspiration, is needed to produce a combination ...<sup>23</sup>

Sen bequeathed to subsequent developers of 'Hindu science' the crucial notion that Hindus were particularly sensitive to and receptive of the workings of the Spirit:

The subtle Hindu mind has always been distinguished for its spirituality. It penetrates the hard surface of dogmatic theology, and evolves and deals with the deeper realities of faith ... The idea of perceiving the Indwelling Spirit, far from being foreign, is eminently native to the primitive Hindu mind.<sup>24</sup>

By developing a yogic vision, the ancient Hindu seers were able to see the divine presence in natural phenomena, a spiritual insight which could be attained by anyone else who sought to develop it 'according to strict scientific rules and under proper logical tests'.<sup>25</sup> Proclaiming an east-west concordance that would have an enduring impact on Hindu interrogations of scientific rationality, he called for England to teach India 'hard science and fact', and India 'sweet poetry and sentiment' to England.<sup>26</sup> These resonant motifs would be adopted by Swami Vivekananda, with distinctively modernized Vedāntic and yogic turns, to speak of spiritual experience as a practical and scientific method of attaining 'superconsciousness' (*samādhi*). Echoing Sen, Vivekananda emphasized that the great religious teachers of the world such as the Hindu sages and Jesus Christ were able to *see* the divine in the depths of their souls, and further it is possible for us too, in these times, to attain this spiritual vision. Therefore, rejecting the view that these foundational experiences have now become obsolete, he argues:

If there has been one experience in this world in any particular branch of knowledge, it absolutely follows that that experience has been possible millions of times before, and will be repeated eternally. Uniformity is the rigorous law of nature, what once happened can always happen.<sup>27</sup>

Like the law of physical gravitation, which is not a human construct, the spiritual laws that govern the relations between spirits and between an individual spirit and the divine reality too 'were there before their discovery, and would remain even if we forgot them'.<sup>28</sup> Thus, Vivekananda presented the Vedas, in his lectures to western audiences, as a repository of the experiences (*anubhava*) of gifted individuals who were able to verify the spiritual laws enshrined in them through a direct apprehension.<sup>29</sup> For Vivekananda, the appeal to the 'universality' of Vedic wisdom through the idioms of contemporary science was a key aspect, as Tomoko Masuzawa has pointed out, of his envisioning of the world-historical significance of Hinduism as an all-embracing spiritual frame which could heal the fissures on western industrialized landscapes.<sup>30</sup> Thus, Vivekananda argues that the depths of the transcendental self are accessible through an inward turn that is guided through yogic practices, and it is this experiential turn, and not scriptural statements or institutional structures, that constitutes the spiritual life that is innate to the Hindu: 'Let others talk of politics, of the glory of acquisition of immense wealth poured in by trade, of the power and spread of commercialism, of the glorious fountain of physical liberty; but these the Hindu mind does not understand and does not want to understand. Touch him on spirituality, on religion, on God, on the soul, on the infinite, on spiritual freedom, and I assure you, the lowest peasant in India is better informed on these subjects than many a so-called philosopher in other lands. I have said ... that we have yet something to teach to the world'.<sup>31</sup>

With Vivekananda, we see the term 'science' being employed on two distinct registers: Science<sub>EMP</sub>, which is roughly consonant with versions of sensory-based western empiricism, and Science<sub>VED</sub>, which refers to supra-sensuous Vedāntic and yogic practices of self-realisation. At one level, yogic insight is said to be 'scientific' because in a manner similar



to the processes of scientific discovery, it is grounded in direct experience which is available to all human beings.<sup>32</sup> However, the 'direct perception' of yoga through which one demonstrates the existence of God is not everyday sensory perception but a superconscious state (*samādhi*).<sup>33</sup> Occasionally, Vivekananda could shift across the registers in a single statement: Advaita Vedānta is said to be the 'only religion which agrees with, and even goes a little further than modern researches, both on physical and moral lines ... and that is why it appeals to modern scientists so much'.<sup>34</sup> One aspect of this agreement is the Vedāntic notion of manifestation or 'unfolding' of the world from Brahman as opposed to the Christian doctrine of creation:

Manifestation, and not creation, is the word of science today, and the Hindu is only glad that what he has been cherishing in his bosom for ages is going to be taught in more forcible language, and with further light from the latest conclusions of science.<sup>35</sup>

This dialectic of affirming the provisional value of the empirical sciences (Science<sub>EMP</sub>) whilst enfolding them into a more integral Vedāntic vision (Science<sub>VED</sub>) can be noted in a lecture Vivekananda delivered to the Brooklyn Ethical Association in 1895, where he claimed that algebra, geometry, and astronomy, products of modern science, could be traced back to ancient India. He then proceeded to state that India had, however, received in return nothing but contempt from the rest of the world. Yet, Indians do not plead for mercy, for they 'trust in the eternity of truth'.<sup>36</sup> For Vivekananda, this is the higher truth of Advaitic unity, which is scientific and capable of truly satisfying the human intellect:

The salvation of Europe depends on a rationalistic religion, and Advaita – non-duality, the Oneness, the idea of the Impersonal God, – is the only religion that can have any hold on any intellectual people. It comes whenever religion seems to disappear and irreligion seems to prevail, and that is why it has taken ground in Europe and America.<sup>37</sup>

Therefore, whilst Orientals have much to learn from Occidentals in the empirical matters of machine-making, Occidentals who seek the truths of the self and the divine 'must sit at the feet of the Orient to learn'.<sup>38</sup>

The emphases on Advaita as a 'scientific religion' for universal humanity highlight a theme that has been at the centre of much scholarly debate regarding the relation between the guru and disciple pair of Ramakrishna and Vivekananda.<sup>39</sup> Whilst Ramakrishna is sometimes presented as having moved through theistic experiences to the apex of Advaitin absorption (*nirvikalpa samādhi*), the conversations between him and some of his disciples reveal instead a range of his Vaiṣṇava, Tāntric, and Vedāntic experiences without any clear-cut hierarchical organization amongst them.<sup>40</sup> He used various metaphors – such as the water being called by different names by different people, an ascent to the top of a house by means of a ladder or a staircase or a rope, and a mother who nurses her sick children with different kinds of food – to emphasize the point that different religions had been produced by the divine to suit different aspirants, times, and countries.<sup>41</sup> Further, Ramakrishna saw social service as a possible distraction which could lead people away from God or, even worse, fill them with a desire for acquiring name and fame. Vivekananda, however, actively engaged in projects of self-fashioning on various fronts – famine relief, yogic practice, and religious harmony – to build modernized forms of 'Vedantic Socialism' which are presented as this-worldly, socially involved, and scientifically grounded. At the same time, Vivekananda, often regarded as the quintessential 'individual of action' (*karma-yogī*), also retained, in traditional Vedāntic style, an anxiety about too deep an involvement in worldly matters. As Amiya Sen has noted: 'Throughout his life Vivekananda struggled at reconciling what appear to be polar opposites, a radical, this-worldly approach to human existence and an extremely abstract viewpoint in which life and its several problems were insubstantial and transitory'.<sup>42</sup>

## The two 'sciences' (*vidyā*) of Vedāntic Hindu thought

Vivekananda's appropriations of Darwinian evolution through the lens of the spiritual progress of humanity too were structured by his engagements with the levels of Science<sub>EMP</sub> and Science<sub>VED</sub>. At the former, he maintained that Vedic insights had anticipated Darwin's theory: 'The idea of evolution was to be found in the Vedas long before the Christian era; but until Darwin said it was true, it was regarded as a mere Hindu superstition'.<sup>43</sup> However, Vivekananda also argued that Darwinian organic evolution was only a limited understanding of the truth that classical Indian yogis such as Patañjali had discovered. The key opposition lies between the non-teleological character of Darwinian evolution (Science<sub>EMP</sub>), which operates through mutation and natural selection, and the deeply teleological emphasis of Vivekananda's notions of progressive spiritual evolution (Science<sub>VED</sub>).<sup>44</sup> He highlighted this distinction in the following manner:

The two causes of evolution advanced by the moderns, viz. sexual selection and survival of the fittest, are inadequate ... But the great ancient evolutionist, Patañjali, declares that the true secret of evolution is the manifestation of the perfection which is already in every being; that this perfection has been barred and the infinite tide behind is struggling to express itself. These struggles and competitions are but the results of our ignorance, because we do not know the proper way to unlock the gate and let the water in.<sup>45</sup>

Therefore, empirical processes such as Darwin's natural selection are only the natural means through which human beings carry out their spiritual exercises of unfolding, that is to say, 'evolving', the true self within. Further, Darwinian evolution is only one arc of the circle – the other is the process of 'involution' through which the true self had become implicated or 'involved' in worldly embodiment. Since evolution is the temporal manifestation of what was earlier implicitly present, Vivekananda claimed that if 'a Buddha is the one end of the change, the very amoeba must have been the Buddha also. If the Buddha is the evolved amoeba, the amoeba was the involved Buddha too'.<sup>46</sup> Thus, the Darwinian theory is located within a Hindu worldview by being assigned to the empirical level of physical forces, which are said to be operative in the struggles of human beings to manifest their true spiritual identity through yogic control. Thereby, Darwinian evolution is identified with Patañjali's yoga and 'at the same time subordinated to it by claiming superiority for the "spiritual" Indian version'.<sup>47</sup>

Around half a century after Vivekananda, another Bengali Hindu, A.C. Bhaktivedanta Swami Prabhupada, the founder of ISKCON, elaborated this dialectic of provisionally affirming western 'materialistic' science, and negating it in the spiritual light of the higher Vedic science of Krishna Consciousness. His *Easy Journey to Other Planets* is a long meditation on certain discoveries of the Russians and the Americans, and their futility in the matter of providing human beings with true 'scientific' understanding of the inner self as a devotee of Krishna. Prabhupada begins by noting a news clip in the *Times of India* (27 October 1959), which states that two American scientists have been awarded the Nobel Prize in Physics for their discovery of the anti-particle, and that according to their theory 'there may exist another world, or an anti-world, built up of anti-matter ...'.<sup>48</sup> Prabhupada comments that the 'students of theistic science' view the real anti-matter not as the anti-particle that the scientists have recently discovered, for this entity is only another form of material energy, but the imperishable spirit indicated in the *Bhagavad-gītā*, which states that the creative energy of Krishna is of two forms: the higher *aparā prakṛti*, which produces the anti-material spiritual world, and the lower *parā prakṛti*, which produces the material world.<sup>49</sup> The anti-matter mentioned in the *Bhagavad-gītā* includes the permanent, blissful, and individual conscious self (*jīva*), which is finer than all material particles, and which the western scientists have not yet discovered. However, science will be perfected when scientists are able to know 'the qualities of the anti-material particle and liberate it from the association of non-permanent material particles. Such liberation would mark the culmination of spiritual progress'.<sup>50</sup> Therefore, the discovery of matter and anti-matter, which are only two forms of the limited *parā prakṛti*, is 'just the beginning of the progress of science', and western scientists shall seek to discover the true spiritual source of the material and the anti-material particles.<sup>51</sup>



Prabhupada's interrogation of western science proceeds through a tentative affirmation of certain aspects of Science<sub>EMP</sub> which he claims to have been foreshadowed in the Vedic texts. He refers to the statement of a Professor of astronomy, Boris Vorontsov-Veljanino, in a Moscow news release (21 February 1960), that there is 'an infinite number of planets in the universe inhabited by beings endowed with reason', and states that it confirms the verse in the *Brahma-saṁhitā* which notes that there is an infinite number of universes.<sup>52</sup> Further, one should not think that in chanting the name of Krishna the devotees are lagging behind scientifically because interplanetary travel has been recorded in the *Bhagavad-gītā*.<sup>53</sup> However, Science<sub>EMP</sub> is of limited value in taking individuals 'back to the Godhead', for whilst scientists may seek to reach the planets with spaceships, rockets, and satellites, they are unable to approach even the planets in the higher regions of the material sky, not to mention the spiritual domain of Krishna which is completely beyond the material sky.<sup>54</sup> Reflecting the Vedānticized appropriation of Darwinian evolution that we have noted earlier, Prabhupada states that through psychological changes or yogic powers, individuals can travel to the planets because the 'gradual evolutionary progress of the material body depends on psychological changes within the mind'. Therefore, people who train the mind to turn away from the material world to the spiritual form of Krishna through devotional service will attain Krishna in the spiritual sky.<sup>55</sup> These devotees of Krishna, unlike the practitioners of gnosis (*jñāna*) or yoga who seek to move to other material planets, do not wish to reach any material planet but Krishna himself.<sup>56</sup> Nevertheless, Science<sub>EMP</sub> can serve a propaedeutic function in the spiritual quest: since 'gross materialists' do not believe in the existence of any anti-material worlds and remain immersed in material energies, 'it is a good sign, therefore, that the materialistic scientists are gradually progressing towards the region of the anti-material world'.<sup>57</sup> However, Science<sub>EMP</sub> is at best a limited pointer towards the yoga of devotion (*bhakti*) to Krishna, for this spiritual path is the ultimate science: 'Everything in Kṛṣṇa consciousness is scientific. It is not bogus, whimsical, sentimental, fanatical or imaginative. It is truth, fact, reality'.<sup>58</sup>

The continuing vitality of this dialectic, where the empirical methodology of Science<sub>EMP</sub> is enfolded into its supposed fulfilment in Science<sub>VED</sub>, is indicated by its appearance in the intensely contested topic of 'Hinduism and quantum physics', where it is often claimed that an adequate interpretation of quantum theory can be supplied by the wider metaphysical horizons of Vedāntic thought. The key difference between Newtonian classical physics and quantum physics is that the state of a classical system is, in principle, measurable deterministically, whereas the state of a quantum system is completely described by a mathematical 'wave-function' which only gives the probabilities for the different values of the physical properties of the quantum entities.<sup>59</sup> The crucial point is that there are several interpretations of quantum mechanics which produce the same experimental results, so that they differ only in their metaphysical implications.<sup>60</sup> Some idealist interpretations argue that it is human consciousness which constitutes physical reality by 'collapsing' the wave-function to a determinate value, so that the human observer and what is being observed become co-constituting elements. Thus, Tim Maudlin notes that one of the most metaphysically intriguing claims relating to quantum theory is that it introduces the observer at the fundamental level of physical reality, and a radical form of this statement is that the 'participation' of the observer with the universe somehow brings the universe into being.<sup>61</sup>

Several writers on quantum physics have seized on these idealist interpretations which attribute to human consciousness the power to actualize possibilities. Thus, Amaury de Riencourt argues that there is a 'remarkable echo' of modern physics in eastern metaphysics which speaks of the monistic vision of a deep reality.<sup>62</sup> Elaborating this view, Amit Goswami, who has been developing a form of 'quantum spirituality' for several decades, argues for an interpretation of quantum physics through a 'monistic idealism' where the collapse of the wave-function takes place through the observation of a non-material consciousness, the quantum self (*ātman*).<sup>63</sup> N.C. Panda connects quantum theory more explicitly with classical Advaita Vedānta by arguing that at the subatomic levels dimensions we are not apprehending ultimate reality but are dealing with wave-functions which are our own conceptual constructions. This is why quantum physics uses the word 'participator' and not

‘observer’, because to some degree we construct the reality that we interact with.<sup>64</sup> Since subatomic phenomena are not ontologically basic but are products of our interactions with reality, Panda concludes: ‘Both quantum physicists and the non-dualistic philosophers of Advaita Vedānta agree on the point that the world is an illusion’.<sup>65</sup> However, having correlated Advaita with Science<sub>EMP</sub> in this manner, Panda goes on to note that the theories of modern physics such as big-bang explosion, relativity, quantum mechanics, and so on, are fragmentary and are not capable of offering a complete picture of the universe. Scientists should therefore assimilate certain themes of Advaita into their theories towards a ‘synthesis of science and spirituality’, which would be a metaphysical perspective on totality. Through such unification, they could develop an ‘integral cosmology, an integral philosophy, a total vision and a cosmic religion’.<sup>66</sup>

The theme of the integration of the Science<sub>EMP</sub> of quantum physics into the complete horizon of the Science<sub>VED</sub> of Advaita Vedānta is extensively developed also by Swami Jitatmananda, a monk of the Ramakrishna Order. Thus, at the level of Science<sub>EMP</sub>, he states that a scientist is not ‘a detached observer but is an active participator in the very processes of his experimentation. Physics has already entered the areas of Eastern mysticism’.<sup>67</sup> Physicists are moving towards a vision of unification of the four fundamental physical forces and of mind and matter by following the results of scientific experimental results. Therefore, the vision that is emerging from modern physics resembles the classical Vedāntic notion of Brahman as the eternal basis and the transcendental source of all phenomenal reality.<sup>68</sup> The Vedāntic doctrines teach that the phenomenal world is a deeply interconnected reality, so that to search for an isolated and independent entity such as an electron is a misconception (*māyā*).<sup>69</sup> However, Swami Jitatmananda emphasizes that quantum physics, left to its own conceptual resources, is not able to plumb the depths of the mystery of being. The Vedāntic sages, who developed notions of space, time, causality, energy, the limitations of reason, and so on which are ‘in striking conformity with the ideas of modern physicists’, also possessed a higher intuition which goes beyond reason but does not contradict reason.<sup>70</sup> Scientists, in contrast, cannot move beyond the boundary conditions of their physical equations for Brahman, the eternal substratum, can only be apprehended in a spiritual and mystic way.<sup>71</sup>

The two standpoints of Science<sub>EMP</sub> (whether Darwinian evolution, quantum physics, and so on) and Science<sub>VED</sub> (whether Advaita Vedānta or Krishna Consciousness) employed in these arguments – with the former oriented towards the fulfilment of the latter – are modernized reconfigurations of a complex debate in classical Vedānta relating to the two ‘levels’ of truth, the lower knowledge (*parā vidyā*) and the higher knowledge (*aparā vidyā*) which are indicated in the *Muṇḍaka Upaniṣad* I.1.5. For Śaṅkara (c. 800 CE), the principal systematizer of Advaita Vedānta, only Brahman, because it is immutable and eternal, is truly and unequivocally real. However, from the human social ‘level’, empirical distinctions, which originate in and are sustained by linguistic conventions, are accorded some kind or measure or degree of reality. From this empirical stance, Śaṅkara can speak of acts of devotion as leading to different results such as gradual emancipation or worldly success, for these distinct acts are ultimately directed at the highest Self (*Brahma-Sūtra-Bhāṣya* I, 1, 11). From the transcendental vantage-point, however, for those who have reached the highest state of reality, the apparent world does not truly exist (*Brahma-Sūtra-Bhāṣya* II, 1, 14). Whilst Śaṅkara’s exegesis leads him to elaborate a doctrine of the metaphysical unreality of the world, his arch-rival Rāmānuja (c. 1100 CE) develops a strongly realist reading of the scriptural texts in which the substantively real world becomes a temporal medium for the return of the human self to the Lord Viṣṇu through devotional love (*bhakti*).<sup>72</sup> For our purposes, the significance of these classical exegetical-theological debates is that the Vedāntic distinction between the ‘lower’ knowledge and the ‘higher’ knowledge is often reconfigured by writers in the ‘Hinduism and Science’ genre by mapping them onto Science<sub>EMP</sub> and Science<sub>VED</sub> respectively. Thus, Swami Vivekananda (whose Advaitic synthesis leans at times towards Śaṅkara) and Swami Prabhupada (who develops a robustly theistic form of Vedāntic Krishna-devotion) both argue that unlike western science that has produced only material advancement, Vedic science can direct human beings towards the divine reality and promote genuine spiritual progress.

## The cognitive status of 'Vedic Science'

The trope of 'science', then, plays a complex role in the thought of figures such as Sen, Vivekananda, Prabhupada, and others – whilst empirical sciences such as quantum theory, astrophysics, and others can partly illuminate Vedāntic understandings, these sciences do not have the epistemic reach or sweep of Hindu Vedāntic vision. Common to these Hindu figures is the thesis that contemporary scientific discoveries (whether the law of causation, the principle of conservation of energy, anti-matter, and so on) had already been indicated in the classical Hindu scriptures to direct human beings towards their spiritual essence. The primordially of the Hindu 'science of the self' is highlighted, for instance, in Prabhupada's statement that Vedic knowledge is 'an ancient science which is eternally new. Modern America has reached a stage of civilization where it is ready to ask important questions. This science, as always, is ready with answers'.<sup>73</sup> Prabhupada's view takes us to some of the most contested epistemological debates over whether the forms of Science<sub>VED</sub> that we have highlighted are offering properly 'scientific' answers.

Several philosophers of science over the last five decades or so have actively debated the question of whether there are any necessary and sufficient conditions (such as, for instance, Karl Popper's 'falsification') for demarcating 'science' from 'pseudo-science' or spurious scientific claims.<sup>74</sup> Whether a certain type of cognitive inquiry is classified as 'scientific' will depend on what sort of criteria are being employed: whilst on a minimalist understanding, science is the process of organizing, into systematic cognitive structures, testable knowledge-claims about the world, the more metaphysically contentious question is whether or not our most advanced sciences (such as evolutionary biology, astrophysics, and quantum mechanics) provide an exhaustive enumeration of all the entities which populate the universe.<sup>75</sup> Alex Rosenberg defends a position called 'scientism' which takes physics as supplying the most complete description of reality, so that everything is made up of the basic kinds of things that are enumerated by physics.<sup>76</sup> Those who are opposed to the metaphysical naturalist position that reality consists entirely of the spatio-temporal world argue, in contrast, that attempts to 'naturalize' epistemology are not able to properly account for features of mental life such as intentionality, self-awareness, conceptual powers, and so on.<sup>77</sup> Roger Trigg argues in this connection that the view that only those entities which can be unearthed and explored through the tools of the physical sciences are to be accorded reality 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'.<sup>78</sup> His point is that the naturalist claim that the domain of entities that populate scientific ontology is perfectly congruent with 'reality' is a metaphysical claim *about* science which cannot be offered from *within* science.

The opposition between metaphysical naturalism and Science<sub>VED</sub>, then, is a basic disagreement over 'what there is' and over the structures of reality that our epistemic practices can discover. T. Ellis presents the former position in unequivocal terms:

The indisputable, cumulative, practical success of the natural sciences suggests that the inference to the best explanation for such success is that physicalism is in fact true. Despite metaphysical intuitions to the contrary, consciousness appears to be a property of a very complex, physical system.<sup>79</sup>

Ellis's standpoint has an important classical Indic precursor in the views of the Cārvākas who rejected all notions of supernatural entities, *karmic* causation, and so on, and proposed a naturalistic evolutionism in which empirical diversity is seen as the resultant of the physical interactions of the four basic elements with intrinsic natures (*svabhāva*).<sup>80</sup> Proponents of Science<sub>VED</sub>, in contrast, regard consciousness not as an emergent property of physical structures but as an ontologically independent principle which has somehow (the precise explanation varies across the traditions) manifested, or become implicated in, a physical universe. Therefore, a study of Science<sub>VED</sub> would involve investigations into the conceptual structures of Vedāntic and yogic epistemic styles which try to integrate third-person objective views of the universe into more intuitive, meditative, and relational perspectives.<sup>81</sup> Developing this theme, Jonathan Edelmann writes:

Rather than suggesting that Hindu theology or yogic perception is deficient because it cannot be falsified, one might say the sciences are deficient because they do not meet the criteria for knowledge in the Indian epistemological traditions. My point is that Hinduisms have their own epistemological standards and criteria, and it is these standards one might use in judging the sciences, rather than merely using scientific epistemological standards to judge Hinduism.<sup>82</sup>

However, even if we sidestep the metaphysical disputes, there remains the question of what parallels Science <sub>VED</sub> may share with the methodological aspects of contemporary experimental science. After raising the question as to what one means by 'science' in ancient India, Debi Prasad Chattopadhyaya argues, from a Marxist standpoint, that the 'only discipline that ... contains clear potentials of the modern understanding of natural science is medicine'. Whilst other disciplines such as phonetics, etymology, and calendrical astronomy originate in Vedic ritualism, only medicine moves away from 'magico-religious therapeutics to rational therapeutics ...'<sup>83</sup> Chattopadhyaya emphasizes the empirical methodology of ancient Indian Ayurvedic medicine in texts such as the *Carakasamhitā*, and notes its oppositions to the Vedic Brahmanical traditions with their reliance on scriptural authority and purity rules.<sup>84</sup> Nevertheless, he acknowledges that these medicinal texts are an amalgam of science as well as mythical-soteriological elements, which he argues were introduced by the physicians as a protective cover to provide a semblance of Vedic orthodoxy to their healing practices.<sup>85</sup> More recently, Steven Engler has examined these Ayurvedic texts and argued that whilst they are scientific in the sense of being based on empirical observation, they do not operate with some of the concepts associated with contemporary science such as experimentation, falsification of theories, quantification, and so on. He notes that a conceptual formation does not become 'scientific' merely because it emphasizes observation as a source of knowledge and connects knowledge claims to observations; rather, the concepts should be developed through experimental verification and falsification.<sup>86</sup> Even if we argue that contemporary scientists and practitioners of forms of Hindu yoga are all engaged in a dispassionate quest of objectivity, in the sense that both groups seek to explore and elaborate their distinctive visions of the 'way the world is', the latter do not usually engage in institutionalized forms of peer review, rigorous mechanisms of experimental testing, and so on which are the procedural mechanisms of several empirical sciences.<sup>87</sup>

Therefore, in the case of configurations of modern Vedāntic Hinduism, which appeal to a 'higher' insight (*parā-vidyā*), which is a non-discursive form of knowing which transcends the 'lower' empirical sciences (*aparā-vidyā*), the conflict between Vedāntic self-knowledge and scientific claims becomes particularly acute, because the methodological constraints of the latter do not admit trans-empirical entities, states, or processes. For such an instance of cognitive tension, one can turn to Swami Vivekananda's proposed integration of biological heredity with the reincarnation of a non-physical self: 'Our theory is heredity coupled with reincarnation'.<sup>88</sup> Therefore, when 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',<sup>89</sup> the key point is the content of the 'science' which will have reached total explanatory scope. The claim that Vedic truths provide holistic integrations of the natural sciences can indeed conflict with some of the principles of these sciences, especially if these spiritual horizons encompass vitalism, parapsychology, astrology, and so on, whose scientific status has usually been strongly denied or at least disputed.

### Hindu spiritual vision as a meta-science

Reflecting these problems of linking Hindu doctrines too tightly with the experimental methods of current science, several recent contributors to the 'Hinduism and Science' debate have instead presented Hindu thought as an integrative spiritual horizon for the empirical sciences. Christian writers on contemporary science too have grappled with the problem of affirming the cognitive

independence of the empirical sciences whilst maintaining that these sciences should be (re) envisioned through the lens of faith in Christ. Writing specifically about Christian theology, Mikael Stenmark argues that there are two models through which we may view the relation between ‘science’ and ‘religion’ in terms of reconciliation: the first states that science can bring about reformulations in religion, or vice versa, in their areas of conceptual overlap, and the second that science can confirm religion, or vice versa, in their areas of contact. The first stance is developed by some theologians who claim that the traditional Christian doctrines of God have to be reconfigured, though they may disagree about the extent of revision that they propose. Regarding the second, theologians may 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.<sup>90</sup> Contemporary Hindu writers have often elaborated versions of Stenmark’s second model by claiming that Science<sub>VED</sub> does not directly conflict with Science<sub>EMP</sub> but supplements (or confirms) Science<sub>EMP</sub> by placing its disjointed, partial, and conceptually incomplete disciplines on a holistic spiritual plane.<sup>91</sup> The underlying claim is that the Hindu encounters with Science<sub>EMP</sub> take place at the level not of specific scientific details but of philosophical and theological implications, such that the cognitive autonomy of Science<sub>EMP</sub> is not violated.

One variation on this theme is V.V. Raman’s argument that Vedānta is to be distinguished from science because whilst scientific enquiry is concerned with analysing the empirical details of a transient world, Vedānta is aimed at the realisation (*anubhava*) of the transcendental ground of the physical universe.<sup>92</sup> Raman has written extensively on the theme of ‘Hinduism and Science’, and he notes certain parallels between concepts in quantum mechanics and classical Vedāntic metaphysics; for instance, between the absence of a clear-cut distinction between the observer and the observed at the subatomic level and the Vedāntic doctrine of pure consciousness. However, he argues that we should ‘resist the temptation of equating interesting conceptual parallels with ontological or epistemological equivalence’.<sup>93</sup> He suggests instead, echoing the verse in the *Muṇḍaka Upaniṣad* I.I.15, that we view the relation between the quantum dimension and the macroscopic world in terms of the Upaniṣadic distinction between transcendental (*parā*) truth and empirical (*aparā*) truth, the former being analogous to the wave-function before it is observed, and the latter to the wave-function after it has been measured and manipulated through observation and logic.<sup>94</sup> Sangeetha Menon argues, in an analogous fashion, that even though Hindu philosophy contains discussions related to epistemology, it is not merely a rational enterprise but a wisdom tradition which is grounded in the identity between knowledge (*cit*) and existence (*sat*). She sketches the relation between rational inquiry and integral insight in these terms:

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.<sup>95</sup>

However, given that Science<sub>VED</sub> does not proceed through the iterative sequences of experimentation, framing and testing of quantitative hypotheses, subsequent experimentation, and so on, the claim that Science<sub>VED</sub> can seamlessly subsume, without any cognitive conflicts, the content of the current sciences remains an intensely disputed matter. A fundamental problem underlying claims that Science<sub>EMP</sub> can be assimilated into the transcendental vision of Science<sub>VED</sub> is that the specific empirical details of Science<sub>EMP</sub> cannot always be fitted into the metaphysical systems of Science<sub>VED</sub>.<sup>96</sup> The *Brahma-sūtra*, a set of foundational aphorisms for all Vedāntic systems, begins by stating, ‘therefore, then, the inquiry into Brahman (the ultimate reality)’ (*athāto brahma-jijñāsā*). Whilst such a Vedāntic inquiry into the ultimate reality is similar in some respects to that of scientists in the fields of, say, astrophysics or quantum mechanics, the Brahman indicated by the Vedāntic traditions is not accessible to ordinary reason, controlled experimentation, or mathematical formulation. Again, whilst sciences such as physics seek to understand the temporal evolution of the cosmos through natural causation, forms of Vedānta such as Advaita view all cosmic processes as ultimately illusory appearances (*māyā*) out of the



eternal ground of the timeless Brahman. Therefore, since both science and Vedāntic 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.

As we have seen, a common strategy in Hindu modernisms is to 'spiritualize' the implications of Darwinian evolution, by reorienting it from its naturalistic contexts towards a transcendental goal. These Vedāntic illuminations of neo-Darwinian evolution proceed by *redefining* the basic terms involved: the Vedāntic doctrines are regarded as 'evolutionary' in the sense that they teach the progressive unfolding of natural phenomena under the guardianship of the eternal spirit, whereas, Darwinian evolution is said to be anti-spiritual and limited only to the biological emergence of the species. Here is a clear statement of this move in a lecture delivered by Keshub Chunder Sen in 1877:

Your protoplasm, your natural selection, I leave to be discussed by men like Huxley and Darwin ... But this, I believe, is indisputably true, that in the individual there is something like evolution going on unceasingly ... The animal lives in us still, and wars with incipient humanity ... But if the war goes on, the ultimate result of this protracted series of struggles will be the evolution of pure humanity.<sup>97</sup>

Similarly, though parallels are sometimes proposed between rebirth and the Darwinian transformation of species, the doctrine of *karma* and rebirth does not speak of the organic evolution of *one* species *into* another; rather, these species are taken in the *Puranic* literature to be already existent vehicles for the transmigrating individual self. Again, the recent Hindu attempts to integrate quantum physics into Vedāntic universes often rely heavily on its idealistic or subjectivist interpretations which remain a disputed issue in scientific circles.<sup>98</sup> Part of the complexity is that whilst Einstein and Max Planck vigorously resisted the notion that the physical world is dependent on mind, other founding figures such as Wolfgang Pauli and Erwin Schrodinger, both of whom incidentally had been influenced by the philosophy of Schopenhauer, were more willing to speak of consciousness within the framework of quantum mechanics.<sup>99</sup> Nevertheless, as Eric R. Scerri has noted, the view that the consciousness of the human observer 'collapses' the wave-function is 'something of a minority view' in the scientific world, and further, the consciousness in question is ordinary consciousness that operates through sensory channels and not the deep meditative states of the higher consciousness of Indic mysticisms.<sup>100</sup>

A related question is whether these appeals to the assimilative capacity of Science <sub>VED</sub> involve an epistemic policy of 'anything goes' where any form of indigenous knowledge can be valorized as scientific.<sup>101</sup> According to some writers in the field of Science Studies, which often weaves together various elements of social constructivism, anti-realism, and conceptual relativism, the critique of western science is part of the recovery of 'subjugated knowledges', which were obscured by imperial powers but which can today provide us with modes of encountering the world which are less dualistic, objectivist, and mechanistic, and more organic, spiritual, and holistic. Rejecting the 'positivist' notions of science as based on deductive logic, algorithmic templates, and so on, they seek to embed scientific practices squarely within historical, cultural, political, gendered, and (sometimes) religious perspectives. They argue that there is no transcultural essence to the enquiries and practices called 'science'; rather, we should adopt a conceptual egalitarianism according to which diverse ways of configuring our relations to the world are accepted as reasonable, plausible, and valid. All representations are generated by the will to power, and representations from the perspective of science, regarded as a quintessentially colonial enterprise, are grounded in the attempt to demolish local forms of Indic knowledge. Therefore, the response to 'western' science should be the decolonization of Indian minds through the purging of its categories which are implicated in multiple forms of institutionalized violence. However, our discussion of figures such as Akshaykumar Datta, Vivekananda, Prabhupada, and others has indicated that far from meekly succumbing to the triumphant march of a hegemonic Eurocentric science, they creatively engaged with its complex significances on several distinct registers. As Raman has pointed out, it is possible to reject the Eurocentric assumption that the capacity for scientific enquiry is somehow unique to



Graeco-Christian cultures without setting up a 'Hindu science' whose truth-claims can be validated only within Hindu contexts. Many well-known Indian scientists, such as Satyendra Nath Bose (who collaborated with Einstein), Meghnad Saha, Subrahmanyam Chandrasekhar (who was awarded the Noble Prize for Physics in 1983), and others have themselves regarded certain methodologies and criteria of 'western science' as, in fact, trans-cultural, universal, and international.<sup>102</sup> That is, whilst rejecting the thesis that science is essentially or distinctively a European practice, one can highlight certain epistemic cultures in classical Hindu contexts such as Vedāntic-Buddhist dialectics, intra-Vedāntic dialogues, and so on, which are broadly continuous with current modes of scientific inquiry which are based on mutual engagement, rational deliberation, and public discussion between proponents of rival standpoints.<sup>103</sup> More broadly, a significant amount of historical literature has highlighted the diverse ways in which western sciences, scientific empiricism, and scientific reason were received, adapted, and partly reconfigured by some key figures in colonial India. Gyan Prakash has pointed to the translations of western scientific ideas into indigenous idioms, which led on occasion to interrogations of traditional worldviews.<sup>104</sup> A distinctive figure in this respect was Vidyasagar whose work involved processes of 'vernacularization' where western and Sanskritic vocabularies were combined to produce a third idiom.<sup>105</sup> Therefore, regarding the diverse modernized Vedāntic appropriations of 'western' science that we have discussed, the vital debate is not so much over the plausibility or adequacy of certain trans-cultural notions of truth, rationality, and objectivity, as over *which* worldview (Vedāntic, Christian, metaphysical naturalist, and so on) supplies the proper cognitive frame for these notions.

## Conclusion

The discourse of 'Hindu science' emerges towards the end of the nineteenth century at the confluences of several crisscrossing east-west currents, and is shaped both by orientalist and Christian missionary representations of Hindu otherness, and by Hindu intellectual modes of cultural self-affirmation. The privileging of 'experience' is a central aspect of these modern Hindu engagements with science, which seek to present Hinduism not through the foci of ritual competence (*adhikāra*), modes of worship, study of scriptures, and so on, but as a rational, anti-clerical, and contemplative way of life which is universally available. Thus, 'Hindu science' emerges through a reconfiguration of classical Vedāntic understandings of the self whose universality is said to be accessible through the vocabulary of scientific empiricism, beyond the boundaries of traditional modes of exegetical training, scriptural meditation, and contemplative practice. Embodying in his person some of these currents, Swami Rama Tirtha (1873–1906) aligns, during his lectures in America, the autonomy of the Advaitin self with scientific experimentalism:

The word Vedanta means the ultimate science, the science of the soul, and it requires a man to approach it in the same spirit in which you approach a work on chemistry. You don't read a work on chemistry, taking it on the authority of chemists like Lavoisier, Boyle, Reynolds, Davy and others. You take up a work on chemistry and analyse everything yourself ... So a religion that is based on authority is no religion. That alone is truth which is based upon your own authority.<sup>106</sup>

The 'experimental basis' of Hinduism was also emphasized by S. Radhakrishnan who argued that Vedic truths could be re-experienced and re-confirmed by individuals in the present:

The chief sacred scriptures of the Hindus, the Vedas register the intuitions of the perfected souls. They are not so much dogmatic dicta as transcripts from life. They record the spiritual experiences of souls strongly endowed with the sense of reality.<sup>107</sup>

Radhakrishnan's complex understanding of the relation between spiritual experience and Vedic statements (*śruti*) seems to combine aspects of the two views of this relation outlined by Arvind Sharma. According to the first, the Vedas are the records of the transcendental experiences of the seers, and these experiences, which are self-certifying, are a distinct means of knowing reality. Whilst the Vedas are the usual vehicles of apprehending the ultimaterality – through the three-

fold means of hearing the truth (*śravaṇa*), reflecting on the truth (*manana*), and meditating on the truths (*nididhyāsana*), which are indicated in the Vedas – the ultimate reality can *also* be known independently of the Vedas. According to the second, whilst the ultimate reality is self-evident, an individual's understanding of what this reality is like remains obscured by ignorance, which can only be dispelled by scriptural knowledge. Therefore, the Vedas are the sole criterion of validity of our putative experiences of the ultimate reality. Śaṅkara himself seems to accord primacy not to experience but to scripture; however, he also speaks of a living enlightened teacher (*Chāndogya Upaniṣad* 6.14.2) so that the traditions of Advaita are grounded in the continuity of transmission of truth by those who have experienced Brahman. Therefore, Sharma concludes that while a synchronic view of *śruti* tends to downplay the role of experience vis-à-vis scripture, a diachronic view of Advaita as a living tradition handed down from teacher to pupil – coupled with the desirability of a *realized* teacher – brings experience back into the picture'.<sup>108</sup>

On the one hand, Radhakrishnan seems to suggest the first view when he draws on not only Upaniṣadic sources, but also thinkers as widely varied as F.H. Bradley and Baron von Hügel in configuring his understanding of experience.<sup>109</sup> On the other hand, Radhakrishnan's appeals to 'experience', which adopt the vocabulary of Science<sub>EMP</sub>, are still packaged with claims from the interpretative framework of Science<sub>VED</sub>. Thus, for Radhakrishnan, the 'experience' in question is an Advaitic supra-rational 'intuition' which is self-established (*svatassiddha*), self-evidencing (*svasaṃvedya*), and self-luminous (*svayaṃ-prakāśa*); further, it is its own cause and its own explanation, and is both truth-filled and truth-bearing.<sup>110</sup> Referring to 'a tendency on the part of thought to make relative truths into absolute ones, provisional hypotheses into final statements', Radhakrishnan claimed that scientific hypotheses are in fact abstractions, and they do not adequately apprehend the fullness of an integral experience which is beyond the constraints of logical proof.<sup>111</sup>

We thus return to a point we have highlighted on several occasions in this essay: the conceptual viability of the project of 'Hindu science' (which includes the significant contributions of ancient and medieval India in the fields of algebra, trigonometry, astronomy, and others) depends crucially on whether, and to what extent, the specific content of the current sciences can be encapsulated within Vedāntic visions of the self.<sup>112</sup> Consider Vivekananda's claim: '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',<sup>113</sup> which both a scientific field such as physical cosmology and Vedāntic metaphysics could accept. However, since both these disciplines are – at least potentially – totalizing systems of thought, the key question relates to the arbitration of conceptual boundary disputes that ensue when each system claims complete explanatory competence. Thus, when Sen claimed that Darwin, Huxley, Spencer, and others were 'unconscious labourers in God's vineyard' who were 'engaged in the work of unification', all these figures would not have agreed with his conclusion that the *culmination* of this unification would be the transcendental God-force underlying natural phenomena.<sup>114</sup> Again, the plausibility of his statement that in his New Dispensation 'faith and reason shall be harmonised in the true science'<sup>115</sup> turns crucially on reading the 'true science' through his highly eclectic form of Science<sub>VED</sub>. Therefore, whilst certain Vedāntic doctrines will 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 will 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.

The key challenge, then, is to spell out the relations between scientific inquiry and Vedāntic doctrine such that the latter illuminates the former without violating its cognitive autonomy and methodological integrity. For instance, 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 often removed, as we have seen,

by positing the former as a biological means which can partly assist the perfection of the latter. Whilst neo-Darwinian evolutionary biology usually rejects matter-spirit dualisms, and argues for consciousness as an emergent property of physical structures, modern Vedāntic reflections on evolutionary biology regard spirit as (ontologically or logically) independent of materiality. Meera Nanda highlights this problem when she argues that some of the declarations about parallels between quantum physics and Vedāntic thought respect neither the integrity of physics nor the authenticity of mysticism that is at the heart of Vedānta: physics is turned into mysticism and Vedānta is made to sound as if it were chiefly concerned with understanding the material world, which it never was.<sup>116</sup>

There are extensive parallels to this vexed matter of connecting religious worldviews to the empirical sciences in Christian theological circles, where various exegetical and theological manoeuvres have been tested in the voluminous literature on the 'Religion and Science' debates. For instance, the Jesuit priest-scientist William R. Stoeger claims that whilst certain philosophical interpretations of quantum physics can be found to be in direct conflict with Catholic theology, if both quantum mechanics and Catholic doctrine are properly understood, there cannot be any intrinsic contradiction between them since the results of the sciences are to be viewed 'as a fruit of our rationality and as an indirect reflection of the Creator in nature'.<sup>117</sup> This positive valuation of scientific enquiry reminds us that some of the most important natural philosophers of the scientific revolution such as Boyle, Leibniz, and others were devout Christians who sought to develop theological positions along with their philosophical understandings of the world. We find such a move to 'layer' divine action onto a world run by naturalistic causation in Mahendra Lal Sircar (1833–1904) who claimed, in a lecture in 1869, that the pursuit of scientific knowledge and experimental methods would not undermine religion for 'science leads to a firm belief in the Deity and a devout attitude of mind before the great First Cause'.<sup>118</sup> As we have seen, developers of 'Hindu science' such as Vivekananda, Radhakrishnan, Swami Prabhupada, and others start from Vedāntic presuppositions which articulate all-encompassing visions of reality and they seek to integrate into these visions the contents of the empirical sciences. As with all other attempts to integrate 'science' into 'religion', the enterprise of 'Hindu science' too remains work in progress, as its practitioners seek to infuse scientific vocabularies into modernised templates of classical Indic systems.

## Notes

1. Fehige, 'Introduction,' 10.
2. Harrison, "'Science" and "religion": constructing the boundaries,' 25.
3. Ibid., 30.
4. Dawid, *String Theory and the Scientific Method*.
5. Finocchiaro, 'Science, Religion, and the Historiography of the Galileo Affair: On the Undesirability of Oversimplification,' 114.
6. Arnold, *Science, Technology and Medicine in Colonial India*, 212.
7. Raina and Irfan Habib, 'The Missing Picture: The Non-emergence of a Needhamian History of Sciences of India,' 281.
8. Killingley, 'Hinduism, Darwinism and evolution in late-nineteenth-century India,' 178.
9. Duff, *Missions the chief end of the Christian church*, 86.
10. Trevelyan, *The Competition Wallah*, 305.
11. Quoted in Raychaudhuri *Perceptions, Emotions, Sensibilities*, 56.
12. Raychaudhuri, *Perceptions, Emotions, Sensibilities*, 29–31.
13. Bebbington, *Evangelicalism in Modern Britain*, 57–59.
14. O'Hanlon, *Caste, Conflict and Ideology*, 56.
15. Ibid., 52.
16. Jordens, *Dayananda Sarasvati*, 70.
17. Kopf, *The Brahmo Samaj and the Shaping of the Modern Indian Mind*, 67.
18. Tagore, *The Autobiography of Maharshi Devendranath Tagore*, 75.
19. Tagore, *Brahmo dharma*, 15, 33.

20. See above 17., 139.
21. Sen, *Lectures in India I*, 204–206.
22. Lavan, 'The Brahmo Samaj: India's First Modern Movement for Religious Reform,' 17.
23. Damen, *Crisis and Religious Renewal in the Brahmo Samaj (1860–1884)*.
24. Ibid., 207.
25. Brown, *Hindu Perspectives on Evolution*, 110.
26. Ibid., 326.
27. Vivekananda, *The Complete Works*, vol.1, 126–7.
28. Ibid., vol.1, 7.
29. Rambachan, *The Limits of Scripture*, 60.
30. Masuzawa, *The Invention of World Religions*, 289.
31. See above 27., vol.3, 148.
32. Ibid., vol. 1, 125.
33. Vivekananda, *Collected Works*, vol.1, 415.
34. See above 27., vol. 2, 138.
35. Ibid., vol.1, 15.
36. Ibid., vol. 2, 510–12.
37. Ibid., vol.2, 139.
38. Ibid., vol.4. 156.
39. Beckerlegge, *Swami Vivekananda's Legacy of Service*.
40. Matchett, 'The teaching of Ramakrishna in relation to the Hindu tradition and as interpreted by Vivekananda'.
41. Smith, *The World's Religions*, 74–75.
42. Sen, *Swami Vivekananda*, 101.
43. Ibid., vol.8, 25.
44. Brown, 'Conciliation, Conflict, or Complementarity: Responses to Three Voices in the Hinduism and Science Discourse,' 609.
45. See above 27., vol.1, 292.
46. See above 31., 407.
47. Killingley, 'Yoga-Sūtra IV, 2–3 and Vivekānanda's Interpretation of Evolution,' 172.
48. Swami Prabhupada, *Easy Journey to other planets*, 11.
49. Ibid., 12–13.
50. Ibid., 17.
51. Ibid., 14.
52. Ibid., 33–34.
53. Ibid., 63.
54. Ibid., 30.
55. Ibid., 35–36.
56. Ibid., 81.
57. Ibid., 25.
58. Ibid., 88.
59. Shimony, 'Conceptual Foundations of Quantum Mechanics,' 395.
60. Omnès, *The Interpretation of Quantum Mechanics*.
61. Maudlin, 'Distilling Metaphysics from Quantum Physics,' 473.
62. De Riencourt, *The Eye of Shiva*.
63. Goswami, 'Physics Within Nondual Consciousness,' 541.
64. Panda, *Māyā in Physics*, 306–307.
65. Ibid., 336.
66. Ibid., 440–41.
67. Swami Jitatmananda, *Modern Physics and Vedanta*, 2.
68. Ibid., 7.
69. Ibid., 33.
70. Ibid., 77.
71. Ibid., 108.
72. Lipner, *The Face of Truth*.
73. Swami Prabhupada, 'An Ancient Science for Modern America,' 8.
74. Pigliucci and Bourdry, *Philosophy of Pseudoscience*.
75. Atkins, *On Being*, xiii.
76. Rosenberg, *The Atheist's Guide to Reality*.
77. Smith, *Naturalism and Our Knowledge of Reality: Testing Religious Truth-Claims*.
78. Trigg, *Beyond Matter: Why Science Needs Metaphysics*, 35.

79. Ellis, 'Growing Up Amid the Religion and Science Affair: A Perspective From Indology,' 605.
80. See above 25., 24.
81. Dorman, 'Hinduism and Science: The State of the South Asian Science and Religion Discourse,' 616.
82. Edelmann, 'The Role of Hindu Theology in the Religion and Science Debate,' 636.
83. Chattopadhyaya, *Science and Society in Ancient India*, 3–4.
84. Chattopadhyaya, *Science and Society in Ancient India*, 97.
85. Chattopadhyaya, *Science and Society in Ancient India*, 372.
86. Engler, "Science" VS. "Religion" in Classical Ayurveda,' 422–24.
87. Edelmann, *Hindu Theology and Biology*, 161–62.
88. See above 37., 441.
89. See above 27., vol.1, 14.
90. Stenmark, 'Ways of relating science and religion,' 282–84.
91. Panda, *Māyā in Physics*, xiv.
92. Raman, 'Science and the Spiritual Vision: A Hindu Perspective,' 83–94.
93. Raman, 'Quantum Mechanics and Some Hindu Perspectives,' 162.
94. *Ibid.*, 166.
95. Menon, 'Hinduism and Science,' 11.
96. Brown, 'Three Historical Probes,' 442.
97. Sen, 'Philosophy and Madness in Religion,' 87.
98. Mohanty, 'Idealism and the Quantum Mechanics'.
99. Marin, 'Mysticism' in quantum mechanics: the forgotten controversy'.
100. Scerri, 'Eastern mysticism and the alleged parallels with physics,' 689–90.
101. Brown, *Who Rules in Science? An Opinionated Guide to the Wars*.
102. Raman, 'Science International (Beyond the West),' 43.
103. Ganeri, 'Well-Ordered Science and Indian Epistemic Cultures: Toward a Polycentred History of Science'.
104. Prakash, *Another Reason*.
105. Hatcher, *Idioms of Improvement*.
106. Dobe, *Hindu Christian Faqir*, 127.
107. Radhakrishnan, *The Hindu View of Life*, 17.
108. Sharma, 'Sacred Scriptures and the Mysticism of Advaita Vedanta,' 173.
109. Halbfass, *India and Europe*, 398.
110. Radhakrishnan, *An Idealist View of Life*, 92–93.
111. *Ibid.*, 224.
112. Subbarayappa, 'Indic Religions,' 202–205.
113. See above 27., vol.5, 519.
114. *Ibid.*, 406.
115. Sen, *Life and Works of Brahmananda Keshav*, 389.
116. Nanda, *Prophets Facing Backward*, 108.
117. Stoeger, 'Quantum Theory, Philosophy, and Theology: Is there a distinct Roman Catholic perspective?,' 170.
118. Quoted in Subbarayappa, 'Indic Religions', 200–201.

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