Hinduism and Science: Contemporary Considerations

with Varadaraja V. Raman, "Hinduism and Science: Some Reflections"; David L. Gosling, "Science and the Hindu Tradition: Compatibility or Conflict?"; Thomas B. Ellis, "Growing Up Amid the Religion and Science Affair: A Perspective from Indology"; C. Mackenzie Brown, "Conciliation, Conflict, or Complementarity: Responses to Three Voices in the Hinduism and Science Discourse"; Jonathan B. Edelmann, "The Role of Hindu Theology in the Religion and Science Dialogue"

SCIENCE AND THE HINDU TRADITION: COMPATIBILITY OR CONFLICT?

by David L. Gosling

Abstract. While much has been written about science and the Abrahamic religious traditions, there is little about the Hindu tradition and science. We examine two recent authors who have explored the relationship between the two, in one case across the full spectrum of Indian history, and in the other with a specific focus on the Bhāgavata Purāṇa, a ninth- to eleventh-century CE document centered on the Lord Kṛishna.

These two publications are compared with a symposium of articles by scientists and scholars of the Hindu tradition that consider both science and religion heuristically in terms of "knowing the unknowable." Each contribution explores this concept in accordance with the scientific or religious topic's internal self-understanding, without any cross-fertilization ("cherry picking") across the boundaries.

Finally, we consider the author's own approach, which is intermediate between the previous mentioned in that it reviews the work of Hindu scientists who shaped the course of their research in accordance with their Vedāntic beliefs. These include Satyendra Nath Bose, who collaborated with Einstein on his quest for a unified field theory, and gave his name to a class of fundamental particles called bosons.

Keywords: design; evolution; Hindu literature; Krishna; Vedānta

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We shall consider recent contributions by scholars on Hinduism and science and carry forward the discussion in more general terms. The first publication is by C. Mackenzie Brown, who is Jennie Farris Railey King Professor of Religion at Trinity University in San Antonio, Texas, USA; it

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is titled *Hindu Perspectives on Evolution: Darwin, Dharma and Design*. The second is by Jonathan B. Edelmann, who is Assistant Professor of Religion at Mississippi State University; it is titled *Hindu Theology and Biology: The Bhāgavata Purāṇa and Contemporary Theory*.

The title of the first publication may have been chosen by the publisher, but it is misleading. What is implied by "evolution"—Darwin's theory, a more up-to-date version of it, the muddled thinking of Herbert Spencer, or the nearest Sanskrit approximation to the term? "Hindu responses to Darwinian evolution" would have been preferable. The subhead mention of "design" clearly refers to the theory of Intelligent Design, to which the author alludes in his Introduction (Brown 2012, xi).

If Brown's book attempts to cover the entire period from early Hindu beginnings until contemporary events, Edelmann concentrates on a ninth- to eleventh-century CE Purāṇa dedicated to the Lord Krishna. The material is therefore much more manageable, and less needs to be said about it.

We shall also consider more briefly a symposium of articles edited by John Bowker, and titled *Knowing the Unknowable*. Contributors include Francis X. Clooney SJ, Parkman Professor of Divinity at Harvard Divinity School; Sarah Coakley, Norris-Hulse Professor of Divinity at Cambridge University; and Rowan Williams, Archbishop of Canterbury. Not all of these focus specifically on the Hindu tradition, but their articulation of the respective roles of science and religion seems to offer the most fruitful context for mutual understanding between them.

Evolution and the Classical Period

C. Mackenzie Brown is best known for his work on the Mother Goddess. But he has more recently published on comparative studies between Hindu and Western thought, ranging from the Classical Hindu period to Colonial and Postcolonial times. In his most recent *Hindu Perspectives on Evolution* he attempts to cover this entire historical period, but his analysis devotes insufficient detail to certain well-researched historical facts. Thus, for instance, he is wrong to describe the theistic Śvetāśvatara Upanishad as early (Brown 2012, 15), and this influences his overall arguments to the extent that he cannot present theism in the Upanishads as being as foundational as he might wish. He certainly devotes considerable space to nondualism (*advaita*), which he describes as monism, but the overall thrust of Upanishadic philosophy is only secondarily theistic.

In his Preface, Brown states, "The immediate inspiration for this study was the anti-Darwinian criticism of the Hindu creationist A. C. Bhaktivedanta Swami Prabhupada" (xi)—founder of the Hare Krishna movement. But "Darwinism" is a nineteenth-century scientific theory that has been subsequently supplemented and developed, whereas "evolution" is

a term that can mean many things according to context. (Darwin avoided it in his *Origin of Species*.) The nearest Sanskrit equivalent is *pariṇāma*, which is to be found primarily in the atheistic philosophical school known as the Sāṃkhya, though it also has nonphilosophical secular connotations such as when milk curdles, for example. The early scholastics and their lay admirers and detractors included the followers of Shankara (c. 600–700 CE), the Buddhists, and the Cārvākas—a diverse group about which little is known except through the literature of their enemies (they believed in neither caste nor reincarnation and were atheists). They all argued vehemently about the existence of God and an afterlife, but evolution was not an issue for them. And, as we shall see later, Shankara argued against Sāṃkhya philosophy not because it was evolutionary but because it posited a dualistic distinction between *puruṣa* and *prakṛti*. He was even more opposed to the Buddhists—largely because most of his metaphysical tenets are actually very close to Buddhist ones!

In these early debates the term *evolution* is occasionally mentioned. *Dharma* appears frequently, but there are few references to *racanā* ("design," "plan," or "arrangement"). Brown claims that "two Vedāntins, Śaṅkara and Rāmānuja, both use the rational design argument in denouncing the views of atheistic schools like the Sāṃkhya" (59). We shall consider Shankara's position presently, but for Rāmānuja *brahman* is the material cause of the world, and you cannot argue from the effect to the cause, though by faith, when you know that *brahman* is the material cause of the universe, you can appreciate the relationship between them. Rāmānuja maintained that *brahman* is the efficient cause of the universe, using the analogy of the potter making the pot; here again you cannot argue from effect to nature of the cause.

The Bhāgavata Purāṇa

The Hindu tradition is characterized by two types of scripture. Canonical *śruti*, that which is declared, is usually equated with the Veda and includes the Upanishads, commentaries on them, and the *darśanas* (philosophical systems). Remembered tradition or *smṛti* is secondary, but sometimes includes scriptures that for a variety of reasons have become very popular, such as the Bhagavadgītā. The Bhāgavata Purāṇa is *smṛti*.

The secondary character of this Purāṇa and its comparatively late date (which varies between the ninth and eleventh centuries CE) indicate that the title of Edelmann's book is misleading. Edelmann is writing about one particular and late theology within a much wider tradition, most of which is not theistic at all. A more accurate title might have been *Bhāgavata* (*or Krishna*) *Theology and Biology*, but perhaps the publishers are responsible for the one chosen.

The Bhāgavata Purāṇa is a sectarian book centered on the god Krishna, and it assumes a united Hindu tradition. In his Introduction, Edelmann explains his choice as follows:

> The *Bhāgavata* is an ideal Hindu text to draw upon for a scientific and theological dialogue because of its inherent interest in acquiring a correct and factual understanding of the natural world in the context of a theistic, devotional worldview focused on spiritual perfection. The *Bhāgavata* shows a concern for both worldly and otherworldly knowledge, and it affirms the reality of the world as one of the Lord's *śaktis* or powers (e.g., 2.4.12; 10.87.14). Even the structure of the *Bhāgavata* is designed in a manner that suggests a relationship between science and religion. The early books of the *Bhāgavata* contain a sustained argument that a correct understanding of nature is a necessary precondition for understanding God, in particular in Krishna's divine relationship with the Gopīs (cowherd girls) of Vṛndāvana, described in Book Ten. Inquiries about the characteristics of God in the *Bhāgavata* always begin with an inquiry into the origin, development, structure, and destruction of the natural world. The student of the *Bhāgavata* is thus led from the empirical and phenomenon-based observation to a perception of the subtle and transcendent; the study of nature is seen as a step on the path of devotion. Moreover, unlike other branches of Indian thought and practice, such as Advaita-Vedānta (non-dualism) and classical Sāṃkhya, the *Bhāgavata* expresses a personalistic theism which emphasizes the formation of the world by a personal God. I argue . . . that an examination of the *Bhāgavata* can break down hardened, and often naive, distinctions between science and religion in that it shows interest in both devotion to a personal God and the study of the natural world. (Edelmann 2012, 5)

Certainly this Purāṇa discusses biological issues such as human procreation to such an extent that it can function very generally as a bridge or interface between Hindu religion and science. Thus the directive development of a fetus is described as follows:

> To obtain a [suitable] body, the individual, dwelling in a particle of male semen, is made to enter the womb of a woman by means of its karma and divine providence. (Daivanetreṇa: 3, 31, 1)

The Purāṇa also maintains that the experienced fruits of karma should reflect the kind of action causing this effect, but at this point the narrative takes us into a fanciful world far removed from anything scientific. Julius Lipner summarizes this as follows:

> There are lurid descriptions in the Purāṇas of hells in which the punishment is made to fit the crime. The *Bhāgavata Purāṇa*, for example, waxes strong on this. It declares that those who in this life cook animals and birds alive are thrown into a hell called Kumbhīpāka where *they* are cooked in boiling oil; a person who indulges in illicit sex received the hellish recompense of having to embrace red-hot models of men or women (as appropriate); rulers or their officials who extort what is not their due are consigned to a suitable hell where 720 dogs with teeth like thunderbolts get to work on them, and so on. Alternatively, good karma can propel one into the appropriate heaven (there are numerous grades of heaven or *svarga*) where suitable reward is experienced in the form of heightened earthly pleasures in the company of the gods. After one's karmic recompense has been meted out in

heaven or hell one is reborn again in the appropriate sphere of existence. The gods in this belief are often no more than "first among equals"—holders of the different godly offices or names, who themselves, when their good karma is expended, will have to abandon their positions to a successor and be reborn in the manner that their freshly maturing karma dictates. (Lipner 1994, 234)

Edelmann glosses over such embarrassments when he compares the methodology of Bhāgavata practitioners and practicing scientists, as follows:

Bhāgavata practitioners want to understand reality as it really is, not merely as they would like it to be, and this requires detachment from one's ordinary conceptions, beliefs, hopes, and wishes (for instance that the self is the mind-body complex). This sensibility is also central to the image of scientific objectivity; when practicing science, scientists are required to set aside their hopes and wishes that their theory about the nature of reality might be true. Thus both types of practitioners seek objectivity in the sense that they require detachment or dispassion towards one's personal desires, hopes, and wishes in the process of gaining knowledge. In pursuance of these ends, both have developed procedures for achieving dispassion and detachment from personal wishes. For the *Bhāgavata*, it is the practice of yoga and for science it is the peer review of the scientific community.

Aside from the cultivation of dispassion, members of both traditions use testimony when formulating their understanding of reality. For scientists, the use of testimony means relying on and trusting in the words and text of those deemed reliable by the scientific community; for Vaishnavas it means relying on and trusting in the words of the *Bhāgavata* as well as those theologians and yogins who have been ratified by the tradition. (Edelmann 2012, 220)

Some scientists may not concur with such sentiments!

Edelmann has little to say about later periods of Hindu history. We therefore revert to Brown for his analysis of the modern period.

The Modern Period

Brown's treatment of the modern period (Brown 2012, 61–227), stretching from the early nineteenth century onwards, and including the major Hindu reform movements, contains several historical anomalies. As early as page 2 of the Introduction, he quotes Dayananda Saraswati (1824–83), citing a passage in which he enthuses that "the wondrous design [*vividha-racanā*] of the world of many kinds of creatures proves the existence of its author, the Supreme Ruler of all the creation." Brown proceeds to consider William Paley's deism that Dayananda utilizes "with a classical Hindu karmic twist."

This kind of juxtaposition of Western philosophical positions and classical Hindu ones will not do, but in any case Dayananda is a particularly unfortunate choice as an expositor of traditional thought because he has hardly any hermeneutical sense whatever. The central theme of Dayananda's interpretation of the Hindu tradition was that God is one, and the Vedas are his word.

> He, Who is called *Brahma* or the Most High . . . even *Him* I believe to be the Great God. I hold that the four Vedas . . . are the Word of God . . . . They are absolutely free from error, and are an authority unto themselves. (Saraswati 1966, 62)

In order to avoid a contradiction between monotheism and the infallibility of the Vedas, Dayananda was obliged to adopt a very selective and arbitrary approach to scripture. Thus, for example, Agni, taken as the name of God, means "giver and illuminator of all things," but as fire it means "fire which gives victory in battle by means of skillfully contrived weapons"—that is, guns. All modern scientific discoveries could be read back into the Vedas by this sort of deeply flawed technique (Griswold 1967, 118)!

Dayananda was progressive in specific areas; he rejected astrology, for example—and the Arya Samaj appealed to a far wider range of lower-middle-class north Indians than either the Brahmo Samaj or the Ramakrishna Mission. Its anti-Western assertiveness paved the way for the contemporary Sangh Parivar.

Brown does not seem to be sufficiently aware of the fact that although the reform group leaders spoke and wrote fluent English, their mother tongues were usually Bengali or Hindi, and what they said and wrote in these languages when addressing Hindus could be quite different from how they expressed themselves in English to Western audiences. For example, Brown cites my observation that the 1857 Sepoy Uprising occurred just before *On the Origin of Species* was published, and therefore Darwinism did not attract much initial attention. He continues:

> David Gosling notes that a number of illustrated articles on the evolution of humans began to appear from 1873 on in the *Tattvabodhini Patrika*, the Brahmo monthly periodical founded by Debendranath Tagore in 1843. And yet there is no suggestion in these articles "of a debate concerning the implications of biological theories for philosophy and religious belief.". . . Gosling concludes that Hindus were less concerned about Darwinism than their Victorian counterparts in England because of the prevalent Hindu idea of reincarnation that already suggested "a common ancestry for human beings and animals.". . . But as Sircar's 1869 lecture on the physiological or evolutionary origin of the mind indicates, the problematic implications of Darwinian theory for traditional beliefs, especially reincarnation, were present from the start. (Brown 2012, 76, quoting Gosling 1976, 15)

One begins by asking: What start? Presumably from when *Origin of Species* was published in 1859, but where is the evidence for this, and in what language is it expressed? My own researches were conducted jointly with Shri Sukumar Mitra, a distinguished contributor to *Studies in the Bengal Renaissance*, who spent many hours in Calcutta University Library looking for references to Darwin not only in the *Tattvabodhini patrika* but in several intellectually based publications *all in Bengali* from about 1860 onwards. (These are listed in my book cited by Brown [Gosling 1976],

but also in my more recent *Religion and Ecology in India and Southeast Asia* [Gosling 2001, 41], in *Zygon* [Gosling 2011a, 347–8], and in my 2010 Teape lectures published in 2011 as *Darwin, Science and the Hindu Tradition* [Gosling 2011b, 8–23].) All the Bengali literature cited here indicates that Brown is quite wrong to maintain that there was a negative response to Darwinism. Either it was overwhelmingly positive or there was no reaction at all. In favor of his own claim Brown quotes the text of a single speech on the part of "a young Hindu graduate of Calcutta Medical College" who in 1869 asserted "the radical opposition of Darwin's theory to both traditional Christian and Hindu accountings for the presence of the soul or mind in the physical body. He went on specifically to ridicule the idea of rebirth" (Brown 2012, 63). My guess is that this was a bumptious young man playing to the galleries. Why else would he mention Christians as well as Hindus? And even if he was not, one swallow does not make a summer!

Brown leaves his readers with no doubt about his dislike of "oppressive colonialism" (Brown 2012, 1 and elsewhere). Certainly there can be no excuses for certain incidents under British colonial rule such as the Black Hole of Calcutta or the Jallianwala Bagh massacre in 1919. But when it comes to finger pointing, the North and South American massacres of indigenous populations by "white" migrants were probably worse. British colonialism was primarily about the economic and political exploitation of people and resources with a minimum of expatriate personnel and effort. To this end they set up schools and colleges intended to train an elite cadre of English-speaking go-betweens to rule their empire for them. A by-product of this utilitarian strategy was that South Asia still boasts outstanding educational and medical institutions that have produced international-level scholars, many of them scientists. Brown is also generally critical of missionaries, some of whom were racist and arrogant, though many others were deeply committed to science education—thus William Carey founded Serampore College, which still offers its own degrees under a Danish Charter in both science and theology, and he also set up the Botanical Gardens in Calcutta (now Kolkata).

While considering the modern period of history, it is worth recognizing that many Indian historians belong to the subaltern school of historical research, which challenges the assumptions of Western academics writing primarily in English. *Subaltern Studies* was founded by Ranajit Guha, and his first volume about the peasantry in colonial India appeared in 1983 (Guha 1983). The term "subaltern" was inspired by an Italian, Antonio Gramsci and is used to indicate powerlessness in a context where class differentiation, urbanization and industrialization have proceeded very slowly. Subaltern "history from below" implies in the case of modern India that English-speaking elites—foreign and Indian alike—cannot be regarded as the true exemplars of historical continuity. From the point

of view of Brown's study, this means that information based on Sanskrit and English literature needs to be supplemented and challenged from vernacular sources.

Between 2009 and 2011 Brown conducted an international survey addressing two general questions as follows:

(1) What exactly are contemporary Hindu attitudes toward evolution and related issues?

(2) What is the extent to which contemporary Hindus around the world reflect the various perspectives on evolution articulated by the major Hindu thinkers discussed earlier in the book (Brown 2012, 204)?

The survey is wide-ranging and the data include some interesting information from more than 1,500 responses, which were whittled down to exactly 1,000 by eliminating non-Hindus. The survey was placed on a Survey Monkey website, and emails were sent to a variety of temples, student groups, and so forth. Quite a lot of the responses came from the International Society for Krishna Consciousness.

Space does not permit a detailed summary of this study, but it is noteworthy that 65 percent of all respondents approve of the statement that "there is no conflict between Hinduism and evolution" (Brown 2012, 217). It is also interesting to know that 40 percent believe that "intelligent design is a better explanation for the origin and diversity of life than Darwinian evolution" (217). I should have liked to see a clear enunciation of hypotheses that the survey as a whole was designed to test and the use of Chi Square calculations to verify cross-tabulations. (For the use of the Chi Square statistical test, see Downie and Heath 1965, 164ff.)

Brown comments favorably on my own investigation into the beliefs of Indian scientists at five major centers in north and south India. He states that my references to the religious backgrounds of respondents are "occasional." This is not correct because all such data are contained in the tables and interview quotes; in the text some details may have been omitted for brevity. But in India there is considerable sensitivity about specifying one's precise religious group or subgroup, and in some cases people tell blatant lies! An entire doctoral thesis was once totally disqualified because the researcher did not realize that if you hand out questionnaires inviting Hindus to state their caste, most say they are brahmins. But at the Indian Institute of Science in Bangalore I did obtain some fascinating insights into the way in which membership of high-caste subgroups can influence perceptions of how science and religion relate (Gosling 2007, 177, no. 6). Incidentally, it would have been helpful if Brown had put page references to my work in his Index. (There is also no reference in the Index to Julius J. Lipner, who is probably the most outstanding Hindu scholar living!)

Brown's treatment of the Hindu Renaissance reformers provides useful information about a much-neglected group of distinguished thinkers; their earliest spokesperson, Ram Mohan Roy, is after all the "Father of Modern India" (not M. K. Gandhi, however revered he may be in the West!). It is good to see a careful account of Swami Vivekananda's Comprehensive Vedānta, though I missed any reference to his evolutionary ladder (Gosling 2007, 19). I should have liked to see more about Rabindranath Tagore, who was the first Hindu Nobel Prize winner and held erudite philosophical discussions with Albert Einstein in 1930.

God of the Gaps?

Brown devotes slightly more entries in his Index to the "design argument" than he does to "creationism." but it is not always clear what these terms mean. The word *creationist*, especially in North America, can mean "belief in God the Creator," which is entirely compatible with Darwinian evolution, as evangelical Christian leaders such as B. B. Warfield and Charles Hodge would have maintained a century ago. It can also mean "creation as opposed to evolution," which covers a spectrum of interpretations ranging from a kind of punctuated evolution of several lurches forward (which is arguably consistent with the fossil record) and the evolution of complexity, which tempers competition with collaboration—right through to the six-day, young-earth creationism on display at the Kentucky Creation Museum. Judging by the amount of attention that Brown gives to antievolutionist movements, such as the International Society for Krishna Consciousness (ISCON) and the International Society of Divine Love (ISDL), his understanding of creationism lies somewhere along the first part of this spectrum (Brown 2012, 180–1).

Creationism as generally understood began in the early 1920s with an antievolution crusade led by William J. Bryan, and was fueled by the spread of compulsory state-supported secondary school education. The movement lapsed with the death of Bryan but was revived in the 1960s by the publication of *The Genesis Flood* by Henry Morris, which maintained that the earth is less than 10,000 years old and that creation began in six periods of 24 hours. This 1960s movement is often called Young Earth Creationism and is, paradoxically, both antiscience (at least with regard to Darwinism), and committed to the view that science provides the best framework for knowledge.

Intelligent Design theory owes its origins to a US academic, Phillip E. Johnson, who was initially provoked by Richard Dawkins's book *The Blind Watchmaker* (Dawkins 1986). Johnson objected to Dawkins's view that evolution is a godless process on the grounds that he appeared to have no evidence for it, and started the anti-Darwinian Intelligent Design

movement from about 1990 onwards. More recently Intelligent Design seems to have overtaken Creationism in popularity; a BBC poll among British university students in 1996 demonstrated that 56 percent favor Darwinian evolution, 12 percent Creationism, and 19 percent Intelligent Design. Many Intelligent Design proponents reject the arguments of Creationists based on religious texts (e.g., Genesis). What unites them is hostility to the idea that Darwinian evolution is the best explanation for the origins of biological diversity, including biological complex systems—but is not this a bit like bringing back the old "god-of-the-gaps" argument in the guise of "designer of the gaps"?

In the English language "design" can have several meanings. First, it can refer to an arrangement of form and appearance, with overtones of purpose. Living biological organisms fit this description; bricks and meteorites do not. It is this sense in which biological entities can be described as teleological and goal-oriented. "Design" can also refer to a detailed plan as devised by an engineer or architect. It can also describe the generation of a set of rules, as in a computer game, and it can entail a more general out-working of intentions and purposes (e.g., the syllabus was designed to encourage imaginative and interdisciplinary thinking). When Intelligent Design proponents use the term, they usually imply the second interpretation, referring specifically to the design of a complex entity in biology that they maintain can only be explained in terms of a supreme designer—that is, God.

This appears to be how Brown uses the term *design*, but it is not clear to what extent and in which contexts it corresponds to the Sanskrit term *racanā*. The following extract from a lengthy quote from Thibaut's translation of one of Shankara's commentaries is crucial to Brown's argument:

> Since even the most competent craftsman cannot comprehend [the world's construction], how could the non-intelligent Material Nature (*pradhāna*) devise it? In the case of such things as a lump of earth or a stone, no (power of contrivance) is seen, but the design (*racanā*) of special forms out of such things as clay is seen when they are superintended by potters and the like. In the same way, Material Nature transforms itself only when connected with a superintending, external intelligence. (Brown 2012, 30)

Shankara proceeds to defer to scripture, "which designates the cause as intelligent. Therefore, since the design of the world is otherwise inexplicable, its cause is not to be inferred as non-intelligent." Brown admits that this appeal to scripture "significantly weakens the force of [Shankara's] design argument, utilizing it simply as an expedient means when arguing against certain opponents" (31). These opponents are essentially the advocates of the dualistic Sāṃkhya school.

This section and the remainder of Chapter 3 represent the most central and crucial part of Brown's views in relation to Hindu understandings

of design, and his muted approval for Shankara's claims represents a credible though debatable argument irrespective of the truth or otherwise of Intelligent Design.

The most recent and comprehensive exposition of Intelligent Design is Stephen Meyer's *Signature in the Cell* (Meyer 2010). Essentially Meyer invokes Intelligent Design as an "explanation" for the origins of certain forms of biological complexity. His views have been decisively rejected by Denis Alexander, and we shall not discuss them further here (Alexander 2012).

Knowing the Unknowable

John Bowker is a distinguished philosophical theologian whose understanding of science far outstrips that of most of his academic peers. The purpose of *Knowing the Unknowable*, which he edits and contributes to, is "to show what the human engagement with the unknown and the unknowable actually is, and why it is of supreme importance in the development of scientific knowledge, and equally in spiritual growth and exploration" (Bowker 2009, xvi). On the religious front the book focuses on the Indian religions and to some extent Christianity.

Probably the main difference between this publication and the two just discussed is that the treatment by Bowker and his associates explores the religious and scientific quests individually and within their own self-understanding before attempting more general comparisons or reflections. Both Brown and Edelmann have a tendency to "cherry pick" between science and the Hindu tradition. Some of Edelmann's "cherries" seem scientifically progressive, but then readers discover that if their own personal karma is bad, they will be boiled in oil for evermore! The Hebrew scriptures also contain deprecatory passages, but the Abrahamic religions are rooted in history in a manner that permits them to modify their understanding of God with time, whereas the Hindu scriptures are less clearly able to do this (and the Bhāgavata Purāṇa is late).

Brown likes to "cherry pick," looking for evolution and design in places in which his textual translation may be valid, but the context leaves the meaning open to a wider range of interpretations than his fundamental arguments allow.

We shall consider a selection of the contributions to Bowker's symposium in more, though not extensive, detail. John Rodwell, a professional ecologist, shows how science makes progress by refusing to define in advance what is simply unknown (at the moment) and what is unknowable altogether (Bowker 2009, 35ff.). Ramanath Cowsik, Professor of Physics at Washington University in St. Louis, illustrates this thesis with reference to what can be known about the inner dynamics of the sun (45ff.).

Comparable analyses based on the Hindu tradition are given by Gavin Flood, Professor of Hindu Studies at Oxford University, and Francis X.

Clooney SJ, Parkman Professor of Divinity at Harvard Divinity School. These scholars explore the theme of the absence and unknowability of God, where absence is a form of presence, as important for spiritual growth and development. Flood offers particular examples from the approach to God as Shiva (189ff.). Clooney explores the religious poetry of South India, where the absence and apparent unknowability of God evoke *viraha bhakti*, the devotion of longing in the absence of the loved one (227ff.). This contribution is remarkably similar to one by Margaret Bowker, who demonstrates how the Welsh poet R. S. Thomas records what a life before God, which teeters on the brink of the unknowable, feels like and involves (175ff). Rowan Williams, Archbishop of Canterbury, draws the various threads together (257ff.).

All of these contributors present their material within the context of either science or religion, with a minimum of cross-fertilization between the two. This makes the book as a whole quite different from those of Brown and Edelmann.

Einstein Meets Tagore

In 1930 Albert Einstein and Rabindranath Tagore began a series of four conversations in which they discussed the nature of reality from their respective viewpoints. Symbolically, these discussions, of which only the first two are recorded, represented the climax of a progressively deepening encounter between science—initially encapsulated in a European straitjacket—and Indian culture and religion.

The encounter between Western science and Hindu religion was largely facilitated by the decision in 1835 to make the English language the medium of instruction in higher education throughout India. This opened the floodgates for a vast range of European science, literature, religion, and many other things, to be assimilated by educated Indians—Hindus, Muslims, and, later, Christians (and others). It triggered reform movements, such as the Brahmo Samaj, Arya Samaj, and the Ramakrishna Mission, whose leaders to some extent "cherry picked" between science and religion, but some of them also set out comprehensive philosophical systems based on their classical thinkers of the past. Thus Dayananda Saraswati was a "cherry picker" with very little sense of exegetical scholarship (which is why Brown's choice of him was unfortunate), whereas Swami Vivekananda offered a much more robust synthesis of Hindu and Western thought.

Nineteenth- and early twentieth-century Hindu scientists were close to these reformers and shared with them a desire to reconstruct their traditional beliefs in a modern and progressive manner. Some of them, such as Jagadish Chandra Bose, chose their scientific research areas in accordance with their Vedāntic beliefs that all scientific knowledge was converging under common heads. For this essentially Hindu religious and

philosophical reason he did his later research on the possibility of pain in plants. Satyendra Nath Bose, who gave his name to the fundamental class of particles known as bosons (e.g., the Higgs boson), collaborated with Einstein because they both believed in a unified field theory.

The work of these and other Hindu scientists is described in more detail in my book *Science and the Indian Tradition: When Einstein Met Tagore*. The meetings between Einstein and Tagore from 1930 onwards represent a watershed in the Indian context and encourage further reflection and discussion.

Concluding Comments

We have reviewed essentially three different approaches to the encounter between science and the Hindu tradition. Brown and Edelmann have much in common, the main difference being that whereas the former "covers the board" historically, the latter concentrates on a single, and comparatively late, piece of classical literature. Brown appears to scour his material in search of references to evolution (*pariṇāma*) and the notion of design, but some of his claims are not very convincing. His treatment of the nineteenth-century reformers places too much emphasis on Dayananda Saraswati, and his claim that Darwinian evolution was criticized by educated Hindus seems to be based on a single speech by a youthful Bengali addressing an audience in English. He does not appear to recognize that when the reformers and their followers spoke in English, they were often expressing polemical and anti-Western rhetoric; when they spoke and wrote in Bengali, they were either totally accepting of or indifferent to Darwin's theory (as my own researches, conducted in collaboration with a Bengali scholar, have shown). Brown also does not appear to be aware of the subaltern approach to history according to which the "voice of the people" must be given more prominence.

Edelmann sets out his stall by presenting the Bhāgavata Purāṇa as a case study for discussion of religious belief in relation to science, in this case biology. His choice of material is too narrow and sectarian to be representative of the Hindu tradition as a whole, and his tendency to "cherry pick" the credible parts of the Purāṇas and ignore others is problematic.

The contributors to Bowker's symposium are, to my mind, more convincing because they consider either science or religion according to the inherent qualities of each, with very little overlap, and no "cherry picking." The contributions by Flood and Clooney on Hindu themes are well informed and consistent with the approach of the book as a whole.

My own research, some of which is sociological and cannot be easily summarized, is somewhat intermediate in approach between that of Brown and Edelmann on the one hand and Bowker's contributors on the other. Rejecting "cherry picking" decisively I have interpreted the

work of Hindu scientists according to the dominant Hindu philosophy of the nineteenth century, Shankara's *advaita* Vedānta, whereby the many phenomena articulated by discrete branches of science progressively grew together under common heads, culminating in the quest of a unified field theory that was undertaken by Einstein and Satyendra Nath Bose more recently. This all-encompassing task, shared by a member of the Abrahamic traditions and a Hindu, remains incomplete.

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