

FROM ATOMS TO ATMAN: THE GRAND NARRATIVE AND THE EMERGENCE OF SPIRIT

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Big History draws heavily on the sciences to construct its narrative of Cosmos, Earth, Life, and Humanity. It does this against a background of earlier narratives deriving from religion, most of them originating in mythic stories at least two thousand years ago, long before the emphasis on data-driven, evidence-based science developed. Reconciliation between science and religion is often difficult, and becoming more difficult in the face of what international-relations scholar Bassam Tibi calls a ‘worldwide phenomenon of religious fundamentalism’.¹ A literal interpretation of ancient myths has no hope of reconciliation with science, or Big History, but an understanding of the metaphorical and symbolic understanding of myth makes possible a reconciliation in which science enlivens and invigorates ancient mythic narrative. Here, we look at the underlying myths of Hinduism to work out interpretations that harmonize with the Big History worldview.

The essence of Hindu spirituality is the realization that *brahman*, the self, spirit or soul of the universe, inhabits the world we know: every atom and every star, but most importantly, every living thing on Earth, where *brahman* is known as *atman*, the individual self or spirit. This serves, as orientalist Robert Zaehner puts it, to ‘identify the deepest

¹ Bassam Tibi, *Islamism and Islam*, New Haven: Yale University Press, 2012, p. 229.

level of the subjective “I” with the ground of the objective universe’.² This truth itself is the result of a developing mythology, an examination of which forms a starting point for a meaningful reconciliation.

The earliest mythic forerunners of Hinduism are found in the Vedas, specifically the *Rig Veda*, which philosopher and statesman Sarvepalli Radhakrishnan identifies as originating among Indo-European migrants to the Indus River Valley as early as the second millennium BCE.³ The most famous hymn, one of more than a thousand arranged in ten books, is the sixteen-verse *Purusha-Sukta*, which, as translator Wendy Doniger O’Flaherty summarizes, casts the origin of the world in terms of a ‘cosmic sacrifice’ that has analogues in the ‘Indo-European corpus of myths of dismemberment’.⁴ Purusha is a cosmic man from whose sacrifice all things are made: ‘The Man has a thousand heads, a thousand eyes, a thousand feet. He pervaded the earth on all sides’.⁵ Purusha is all of us; his body is our bodies. In terms of our present world population, Purusha has 7.5 billion heads and twice as many eyes and feet. The vertical structure of his body provides a four-part hierarchical valuation and class-oriented social structure: the Brahmin caste, the priests, emerge from his mouth; the Warrior caste from his arms; the People from his thighs; the bottom caste of Servants from his feet.⁶

This linkage of social structure with the structure of the human body is easily recognized as founded on a series of metaphors, but metaphoric linkages extend also to the Earth and cosmos. Everything emerges from him: the sky, Moon, and Sun from his head, mind and eyes; the wind, space and earth from his breath, navel and feet.⁷ A similar metaphorical hierarchy is evident in the seasons, the animals, wild and domesticated, and the Hindu scriptures that are said to have existed from the creation itself, the moment of the primal sacrifice.⁸ Interestingly, the ‘verses

2 Robert Zaehner, *Hinduism*, New York: Oxford University Press, 1966, p. 49.

3 Sarvepalli Radhakrishnan, *Eastern Religions and Western Thought*, Oxford: Oxford University Press, 1939, pp. 118–119.

4 Wendy Doniger O’Flaherty, trans., *The Rig Veda: An Anthology*, London: Penguin, 1981, p. 29. Quotations from the *Purusha-Sukta* are from this translation.

5 *Purusha-Sukta*, vs. 1.

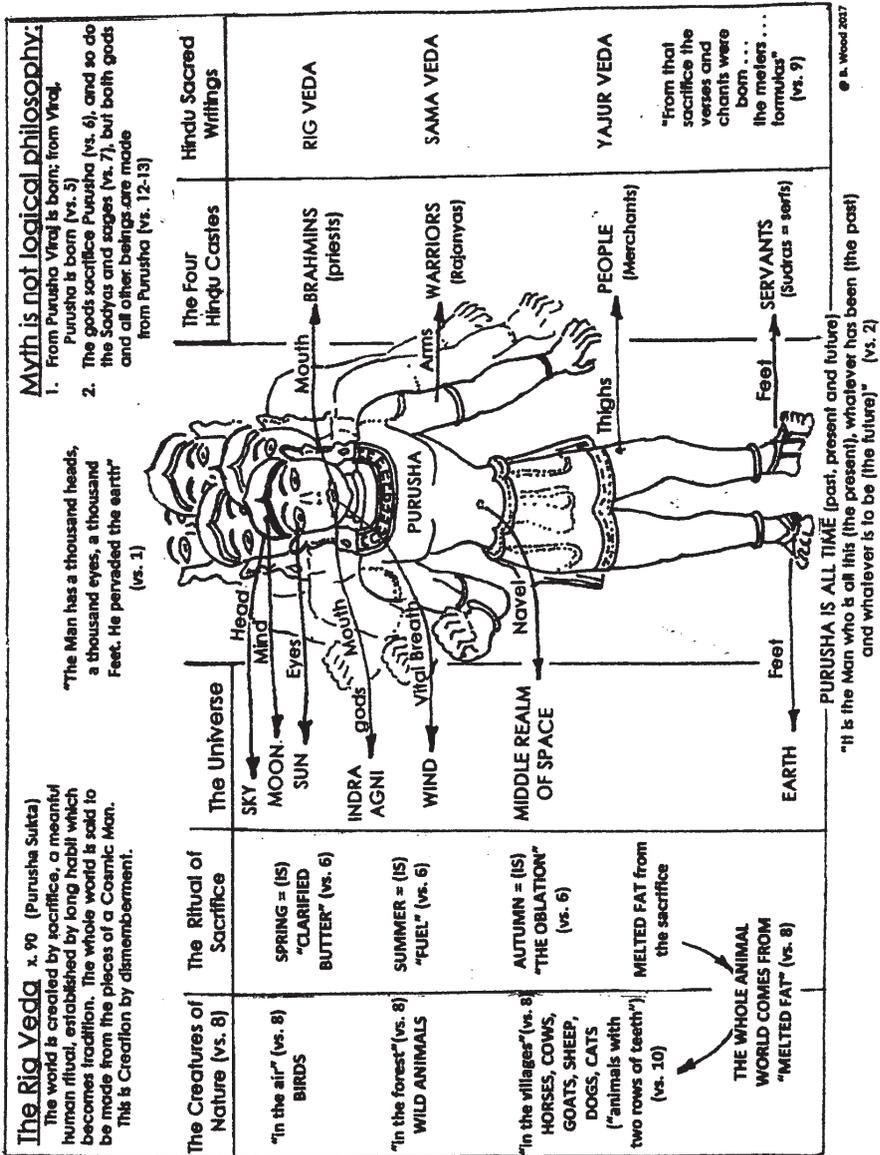
6 *Purusha-Sukta*, vss. 11–12.

7 *Purusha-Sukta*, vss. 13–14.

8 *Purusha-Sukta*, vs. 9.

and chants' of the Rig Veda wherein the *Purusha-Sukta* appears are the highest form of scripture, emanating from the Brahmin caste and thus from the head of Purusha.

The mythic structure of the *Purusha-Sukta* is easily pictured (Figure 1) because it provides a synchronic rather than diachronic image of the world. The action of sacrifice is not detailed; no time-frame is



offered, not even a hint of when this sacrifice may have happened. The focus of the hymn is on the results of Purusha's dismemberment, visible in the present world. It is thus difficult to reframe it in diachronic terms as narrative or history. Time is reduced to a single assertion: Purusha is 'all this (the present), whatever has been (the past) and whatever is to be (the future)', but that is the limit of the temporal dimension in the hymn, thus limiting any sense of an underlying narrative.⁹ In this, Purusha, the Cosmic Man, is not unlike iconic images of most world religions that override the narrative dimension with a time-less symbol: the crucifix in Christianity, the seated sage of Buddhism, the famous Dancing Shiva of Hinduism, *yin-yang* circle of Taoism, and the multiple mandalas of Indian, Tibetan and Southeast Asian religion. Purusha as a cosmic man is not a 'character' in a narrative; instead, as interpreted from later Hindu philosophy, he is clearly a mythic, humanized image for the fundamental identity of *atman-brahman*, the self, spirit, or life of all things.

A more comprehensive imagery is found in the later *Mahabharata*, specifically the eighteen chapters that have assumed a life of their own as *The Bhagavadgita*. The vision that emerges occurs within a lull in the action, a pause in the story: just before dawn, while waiting for the final battle to begin, the warrior Arjuna poses questions of philosophy and the meaning of existence to his charioteer, Krishna. The context is epic: two gigantic armies are ready to destroy each other, but they are descendants of two brothers, whose feud occurred so long ago that their thousands of descendants no longer remember the original cause of their contention. The story is emblematic of the human situation where every war ever fought is between humans who descend from common ancestors. In the story, during the darkness before the dawn, Arjuna understands and sees Krishna as his chariot driver, but as Radhakrishnan clarifies, 'Krishna is represented both as an historical individual and as an incarnation (*avatara*)' of the gods – certainly not as an embodiment of *atman-brahman* – certainly not initially.¹⁰ In the early chapters, Krishna explains the many ways that Hindu religion can be pursued and enlightenment (*moksha*) achieved. Then, in a remarkable theophany in the tenth chapter, he asserts his oneness with the origin of things, mind,

9 *Purusha-Sukta*, vs. 2.

10 Sarvepalli Radhakrishnan, trans., *The Bhagavadgita*, London: George Allen & Unwin, 1948, p. 29. Quotations from the Gita are taken from this translation.

consciousness, fame, prosperity intelligence, splendour, victory, effort, goodness, wise policy, silence, and wisdom.¹¹ Like Purusha, he is ‘the beginning, the middle, and the very end of beings’.¹² ‘[O]f calculators I am Time’.¹³

Of the many domains of reality – considerably more than the four divisions of the *Purusha-Sukta* – Krishna asserts his identity with paragons from all of them, from cosmic to terrestrial, spiritual to inanimate. In contrast with Purusha, who is sacrificed to become everything else, Krishna, in the guise of Arjuna’s charioteer, asserts his oneness with what look like identity assertions – signalled by ‘I am’ (*aham*) – but are really metaphors. To clarify: a statement using some part of the verb ‘to be’ (am, are, is) asserts an identity if both subject and predicate are of the same category of reality, as in ‘A tiger is an animal’. When the verb ‘is’ joins a subject and predicate from different categories, as in Emily Dickinson’s ‘Dying is a wild night and a new road’, the word ‘is’ appears to but does not assert identity; the linguistic structure is metaphor. Krishna’s metaphoric assertions link him with all the major cosmic, spiritual, and terrestrial realms:

<u>Realms</u>	<u>Metaphoric Assertions</u>	
Cosmic	‘Of the lights I am the radiant sun’	(X.21)
	‘Of the stars I am the moon’	(X.21)
Divine	‘Of the Adityas (Vedic gods) I am Vishnu’	(X.21)
	‘Of the gods I am Indra’	(X.22)
Spiritual	‘Of the Vasus (spirits) I am Agni (fire)’	(X.23)
	‘Of the (departed) ancestors I am Aryama’	(X.29)
Human	‘Of divine seers I am Narada’	(X.26)
	‘Of the sages I am Vyasa’	(X.37)
	‘Of warriors I am Rama’	(X.31)
Animal	‘Of cows I am the cow of plenty’	(X.28)
	‘Of beasts I am the King of beasts (the lion)’	(X.30)
	‘Of birds I am the son of Vinata (Garuda)’	(X.30)

11 *Bhagavadgita*, X. 8, 22, 34, 36, 38.

12 *Bhagavadgita*, X. 20.

13 *Bhagavadgita*, X. 30.

- Inanimate ‘Of lakes I am the vast ocean’ (X.24)
 ‘Of rivers I am the Ganges’ (X.31)
 ‘Of immoveable things I am the Himilayas’ (X.25)

The words ‘I am’ (*aham*) appears more than fifty times in *Bhagavadgita* X, an astonishing concentration of metaphoric language. Even the parallel metaphoric assertions of Jesus – ‘I am the bread of life ... I am the light of the world ... I am the good shepherd ... I am the true vine’ – total fewer than a dozen.¹⁴

The language of both the *Purusha-Sukta* and *Bhagavadgita* X describes ultimate reality in terms of the known objects of this world. Myth and symbol utilize this language, identified, as translator Alan Watts noted, by the sixth-century mystic St. Dionysius the Areopagite, in his *Divine Names*, as kataphatic. But Dionysius recognized an alternate language, identified in his *Mystical Theology* as apophatic, which describes ultimate reality as the opposite, or negative, of reality in this world.¹⁵ Apophatic language is founded on the inescapable fact that positive description requires a separation of the objective from the subjective describer, but ultimate reality, *atman-brahman*, can never be the object of knowledge because it is always the subjective knower. While there are several other examples of apophasis in the Western mystical tradition, one of the purest and most sustained usage appears in the Hindu philosophical works known as *The Upanishads*.

Swami Nikhilananda, translator of *The Upanishads*, notes that in this philosophical tradition: ‘Brahman is declared to be indescribable in words and unknowable for the mind’.¹⁶ In the words of the *Katha Upanishad*: ‘Atman, smaller than the small, greater than the great, is hidden in the hearts of all living creatures’.¹⁷ This is not a fact to be known, for, as the *Kena Upanishad* states: ‘It is different from the known; It is above the unknown. ... [It] cannot be apprehended

14 John 6:35; 8:12; 10:11; 15:1.

15 Alan Watts, trans., *The Theologica Mystica of Saint Dionysius*, revised edition, Sausalito: Society for Comparative Philosophy, 7–9; idem, *The Supreme Identity: An Essay on Oriental Metaphysic and the Christian Religion*, New York: Pantheon Books, 1950, p. 60.

16 Swami Nikhilandanda, trans., *The Upanishads*, London: George Allen & Unwin, 1963, p. 35. Quotations from the *Upanishads* are from this translation.

17 *Katha Upanishad*, I.ii.20.

by the mind ... perceived by the eye ... heard by the ear ... smelt by the breath'.¹⁸ The *Mundaka Upanishad* asserts: 'This Atman cannot be attained through study of the Vedas, nor through intelligence, nor through much learning'.¹⁹ To describe *atman-brahman*, apophatic language – the systematic denial of likeness to created nature – is the only appropriate language. As the *Mandukya Upanishad* says: 'It is unperceived, unrelated, incomprehensible, uninferable, unthinkable, and indescribable'.²⁰ The *Brihadaranyaka Upanishad* summarizes: 'Not this, not this'.²¹ The truth of *atman* is thus not discoverable through thought, but rather through realization, summarized in the thematic formula in the *Chandogya Upanishad*: *tat tvam asi*: 'That art thou'; or simply, 'You are It'.²²

The challenge of reconciling Hinduism to the contemporary scientific worldview resides in discovering terms that make sense of both the kataphatic and apophatic traditions of the *Rig Veda*, *Bhagavadgita*, and *Upanishads*. This entails a historicizing or narrativizing of the mythic synchronic visions of Hindu writings to produce an acceptable scientific account, as cosmologist Brian Swimme and philosopher Thomas Berry remark in *The Universe Story*:

[T]he universe itself can only be presented in a story with a mythic as well as a scientific aspect. Science deals with objects. Story deals with subjects. Since every form of being has both objective and subjective modes, neither is complete without the other.²³

This requires a new look at *atman-brahman*, not limited to nominalized entities present everywhere but also as emergent and emerging life, spirit, and self – manifesting progressively through the evolutionary process. The theme of this paper, 'from atoms to atman',

18 *Kena Upanishad*, I.3–9.

19 *Mundaka Upanishad*, III.ii.3.

20 *Mandukya Upanishad*, 7.

21 *Brihadaranyaka Upanishad*, III.ix.26.

22 *Chandogya Upanishad*, VI.viii.7, ix.4, x.3, xi.3, xii.3, xiii.3, xiv.3, xv.3, xvi.3.

23 Brian Swimme and Thomas Berry, *The Universe Story: From the Primordial Flaring Forth to the Ecozoic Era – A Celebration of the Unfolding of the Cosmos*, New York: HarperCollins, 1992, p. 241.

attempts precisely this kind of retelling, so as to recast Hinduism within the universe story – Eric Chaisson’s ‘epic of evolution’ or Thomas Berry’s ‘new story’ – a series of cosmic narratives that make sense of both ancient and modern perspectives.²⁴

The order of the universe is best understood in temporal terms, as an evolution from the most fundamental particles and atoms, to molecular and cellular complexities, then to organic and ultimately extra-material forms of order – social, psychological, and political. This is the distinctive transdisciplinary form of Big History.²⁵ These progressive forms of order are never independent; they make up a tiered hierarchy. Each tier is nested in more foundational tiers so that basic physical laws governing lower levels determine what is possible as complexity increases. In the atomic realm, everything is composed of atoms of ninety-two commonly occurring elements. The common particulate components of their nuclei, protons and neutrons, are evidenced in the regular sequence of atomic weights as one moves up the Periodic Table. In the process of element-making at the centre of massive stars, unimaginable forces of gravity, pressure and heat in millions or billions of degrees lead to head-on impacts of atomic nuclei that induce fusion and the production of higher atoms.²⁶ Each element consists of one more of each of three particles (protons, neutrons and electrons) than possessed by the next lower element.

This description of atomic structure and progression has used kataphatic language to describe the most elementary cosmic processes of element creation. But something happens that forces us beyond kataphatic to apophatic language. If we examine the properties of the

24 Eric Chaisson, *Epic of Evolution: Seven Ages of the Cosmos*, New York: Columbia University Press, 2006; Thomas Berry, ‘The New Story’, *The Dream of the Earth*, San Francisco: Sierra Club Books, 1988, pp. 123–137.

25 See David Christian, *Maps of Time: An Introduction to Big History*, Berkeley: University of California, 2004; Cynthia Stokes Brown, *Big History: From the Big Bang to the Present*, New York: The New Press, 2007; Barry Rodrigue, Leonid Grinin, Andrey Korotayev, eds., *From Big Bang to Galactic Civilizations: A Big History Anthology*, 3 vols., Delhi: Primus Press, 2015, 2016, 2017.

26 E. Margaret Burbidge, Geoffrey Burbidge, William Fowler, Fred Hoyle, ‘Synthesis of the Elements in the Stars’, *Review of Modern Physics*, vol. 29, no. 4, October 1957, pp. 547–650; Marcus Chown, *The Magic Furnace: The Search for the Origins of Atoms*, New York: Oxford University Press, 2001.

hydrogen 1 atom, nothing allows us to predict helium 2 as the result of adding particles. Similarly, considering, say, carbon 6, nothing allows us to predict or calculate the result of adding another set of particles; and when we look at the unique properties of nitrogen 7, nothing can be traced causally to the properties of carbon 6. The most striking change is from carbon 6 as a solid to nitrogen 7 as a gas at normal Earth temperature, a mystery for which we are forced to employ negative apophatic language of the *Upanishads*: it is un-predictable, incomprehensible, un-explainable. The same mysterious change occurs as we move from nitrogen 7 to oxygen 8, or more dramatically in the colour, texture, and value changes from platinum 78 to gold 79 to zinc 80. Each element in the whole series of ninety-two elements emerges as a complete, autonomous, unified cluster of new properties, often with dramatic changes of state, colour, and other properties.²⁷

Three concepts are needed to explain these changes: complexity, self-organization, and emergence.²⁸ The addition of particles through stellar fusion induces a new level of complexity; from this, physical particles self-organize to create a new autonomous unity, meaning that protons and neutrons establish a new order in the nucleus, and electrons arrange themselves into the atomic equivalents of standard orbits. In some cases, with the elements immediately beyond the noble gases (helium 2, neon 10, argon 18, etc. whose orbits are full), the next element self-organizes to establish a new orbital level.²⁹ From complexity and self-organization, new properties emerge, and, while emergence appears as a simple description of a process, it really describes an apophatic

27 Theodore Gray, *The Elements*, New York: Black Dog and Levanthal, 2009.

28 While complexity, self-organization, and emergence are conceptually bound, they are treated separately in a number of important sources. See Roger Lewin, *Complexity: Life at the Edge of Chaos*, New York: Macmillan, 1992; Erich Jantsch, *The Self-Organizing Universe: Scientific and Human Implications of the Emerging Paradigm of Evolution*, Oxford: Pergamon Press, 1980; John Holland, *Emergence: From Chaos to Order*, New York: Basic Books, 1999; Steven Johnson, *Emergence: The Connected Lives of Ants, Brains, Cities, and Software*, New York: Simon & Schuster, 2002.

29 This description relies on the model of the atom developed by Niels Bohr in 1913. Today, quantum physics wrestles with the indeterminacy of locating electrons whose positions are now described in terms of probability. This ultimately indescribable (apophatic) nature of atomic structure may well be the key to truly mysterious process of emergence that runs through every level of reality.

event, where we would expect new properties to appear as effects of component causes, but, in fact, a disjunction is apparent, so that emergent properties appear as uncaused: that is, no logical or rational explanation and no scientific analysis of these emergent properties can explain how the emergence occurred. They appear as if from nothing, from nowhere.

When we move to the next level, where elements are combined into chemical compounds, we discover a similar mystery. Two gaseous elements, hydrogen 1 and oxygen 8, combine to form liquid water – a consequence that lies beyond prediction. Both gases can be compressed to immensely high pressure, but liquid water presents an unexplainable emergent feature: it is virtually incompressible. The unique slipperiness of water has no precursors in its component properties. Higher up the scale, two poisonous elements, sodium 11 and chlorine 17 combine to form ordinary table salt, a substance essential to our survival. *The Merck Index* of more than 10,000 molecules related to biology and medicine includes hundreds that are composed primarily of hydrogen 1, carbon 6 and oxygen 8, each one with unique emergent properties unrelated to their elemental components.³⁰ Hydrogen 1 and carbon 6 combine to form familiar hydrocarbons (acetylene, benzene, butane, ethane, propane): in a truly astonishing number of permutations, these two elements alone combine to form more than ten thousand molecules that have been identified, named and studied, each one featuring variant complexity, unique self-organization, and a singular platform of emergent properties.³¹ With ninety-two naturally occurring elements as a foundation, the total number of combinations of elements runs into the billions and may be beyond calculation. Each of these displays unexplainable properties that push the boundaries of comprehension; they can only be described apophatically.

In the Big History of the Earth, the next step in the nested tiering of matter is organic matter. More than three billion years of life (ca. 4.0 to 1.0 bya) was dominated by eubacteria and archaeobacteria –

30 Marydale O’Neil and others, eds., *The Merck Index: An Encyclopedia of Chemicals, Drugs, and Biologicals*, 13th ed., Whitehouse Station: Merck & Company, 2001, Appendix F.

31 Theodore Gray, *The Molecules: The Elements and Architecture of Everything*, New York: Black Dog & Leventhal, 2014, pp. 11, 19–20.

living organisms invisible to the naked eye, although numbering in the millions in a drop of seawater. The number of elements and chemically composed molecules in an individual bacterium runs into the billions; each one produces a unique platform of emergent properties on which the bacterium can build. This virtually infinite range of emergent property platforms challenges the human imagination.

In the earliest eras of Earth history, autonomous cells clustered, leading to massive concentrations, like coral reefs and stromatolites (the latter are still active).³² The planet-wide extent of this elementary bacterial clustering is evident in stromatolite fossils dating to 3.7 billion years ago – from pole to pole, underwater, and high in the Burgess Shale of British Columbia. Current ocean populations – ‘a bewildering swirl of tiny creatures ... more numerous than the stars in the universe ... unseen marine communities of viruses, bacteria, archaea, single-celled eukaryotes, and small planktonic animals’ – suggest the richness of biodiversity developing over the first three billion years of life on Earth.³³

Such marine richness eventually yielded to cellular interactions, DNA exchange, and a new level of biological complexity: communities of cells, arranged in cooperative organelles that eventually reached a higher level of cooperation in multi-celled organisms. Some idea of the nearly infinite possibilities of tiered complexity is evident in a typical human cell, which is composed of one-hundred-trillion atoms; an average human body is composed of the same number of cells – one hundred trillion. Over the past several billion years, invented patterning has led to billions of species of all kinds – experiments in multiple kinds of complexity and self-organization. The appearance of new platforms or thresholds of emergent properties is the key to biology and evolution up to the highest level of material organization.

In a quantum leap of self-organization, hundreds of millions of years later, we discover the social insects – ants, locusts, termites, wasps – that have evolved what science-writer Len Fisher calls ‘swarm intelligence’, the foundation of an elaborate social structure replete

32 Robert Leis and Bruce Stinchcomb, *Stromatolites: Ancient, Beautiful, and Earth-Altering*, New York: Schiffer, 2015.

33 E. Virginia Armbrust and Stephen Palumbi, ‘Uncovering Hidden Worlds of Ocean Biodiversity’, *Science*, vol. 348, no. 6237, 22 May 2015, p. 865.

with cooperative caring of the young, specialization of roles, and an overlap of generations that allows for the transfer of social behaviour from adults to offspring.³⁴ A breakthrough in this understanding came with E.O. Wilson's 1975 book, *Sociobiology*, which attempts to unpack the biological roots of social behaviour, although the task almost defies analysis.³⁵

With the social insects, we are in new territory: social behaviour cannot be described in purely physical terms. Complexity provided by numbers of individuals in a colony, self-organization for specific roles, and the emergence of unpredictable behaviour from the sheer size of the colony, from a few hundred to many thousand, transcends explanation. Once again, we are up against an apophatic barrier. This is clear through every variety of emergent social behaviour – in cold-blooded invertebrates, flocking birds, mammal herds, carnivore packs, and non-human primates. What we see is increased complexity in higher species, more elaborate forms of self-organization, and the emergence of behaviours (cooperation, conflict, ritual, play) that we recognize in our own household pets, children, and family members, more generally in our elaborate network of communications. The incomprehensible extent and dimensions of social emergence justify Wilson's theme: 'the social conquest of the world'.³⁶

We need another word to describe the unpredictable, unexplainable emergence of social behaviour. We might pour new wine in old bottles and adopt the term *transcendence* – a hitherto religious word employed throughout the history of theology. But we need to define it with an important difference. Historically, transcendence has been employed to evoke a higher domain, a separate super-natural realm, a territory of gods and spirits completely unattainable by humans. Transcendence, in this sense, has been theologically useful for protecting deities from logical and scientific analysis based on rational principles of this world, but the result is a growing discomfort with the entire notion: anything so far beyond rational thought may not exist.

34 Len Fisher, *The Perfect Swarm: The Science of Complexity in Everyday Life*, New York: Basic Books, 2009, pp. 9–22.

35 Edward Wilson, *Sociobiology: The Abridged Edition*, Cambridge: Belknap Press, 1980.

36 Edward Wilson, *The Social Conquest of Earth*, New York: Liveright Publishing, 2012.

The idea of transcendence here evoked is entirely different: it is transcendence that unfolds through time, history and narrative, such that what comes later outdoes all possible predictions from earlier events. Every element, molecule, organelle and organism illustrates this principle; so does mind, consciousness, and imagination. Whatever goes in is utterly dissolved and reconstituted on a higher plane; this is *process* as articulated most completely by mathematician/philosopher Alfred North Whitehead.³⁷ Thus, social and psychological behaviour unfolds in the dimension of historical time, but it transcends the organisms where it appears.

Temporal transcendence is a universal theme in the structure of reality. Each level of reality displays emergent properties that transcend their underlying components. This principle operates from the level of the atomic to the molecular, cellular, organic, psychological, social and linguistic, even the imaginative realm of poetry and literature, which far transcends the linguistic elements of which it is made. Lowell Gustafson has set out a similar case for polity ‘from particles to politics’: the idea of polity is found at the most basic level of material organization and ranges through the entire hierarchy of life to the organized polities humans construct to order local, national, and international life.³⁸ Such insights were hinted at as early as 1950, in *Cell and Psyche*, by biologist Edmund Sinnott, President of the American Association for the Advancement of Science, who wrote that ‘in the regulatory and organizing processes in protoplasm lies the foundation of what are called the psychological or mental activities in animals and especially in man’.³⁹

The path from atoms to *atman* is an evolutionary process, an ever-more sophisticated self-organization marking the progressive emergence of *atman-brahman*, the self of the cosmos and of each entity within it. The scientific mind does not tend to apply humanized terms like ‘self’ to the non-human world, but crucial connections have been made. In 1955, Sinnott explored further ‘the biology of the spirit’, focusing on ‘the organizing, self-regulating purposiveness all living stuff displays’,

37 Alfred Whitehead, *Process and Reality*, New York: Cambridge University Press, 1929.

38 Lowell Gustafson, ‘From Particles to Politics’, *Teaching and Researching Big History: Exploring a New Scholarly Field*, Volgograd: Uchitel Publishing, 2014, pp. 72–99.

39 Edmund Sinnott, *Cell and Psyche: The Biology of Purpose*, New York: Harper & Row, 1950, p. 42.

a precursor to astrophysicist Erich Jantsch's master theory of the self-organizing universe.⁴⁰

In 1980, Chilean biologist Humberto Maturana and his student Francisco Varela introduced the term *autopoiesis*, encompassing the processes of self-creating, self-transformation, and self-renewal.⁴¹ The term resembles the less humanized term 'self-organization' but adds important connotations: an *autopoietic* system, as Jantsch has noted, is 'self-referential' in its carefully balanced self-renewal, leading him to suggest that 'if consciousness is defined as the degree of autonomy a system gains in the dynamic relations with its environment, even the simplest autopoietic systems ... have a primitive form of consciousness'.⁴² These serve as alternate descriptions of *atman-brahman* that is easily nominalized as a supreme, separate, indescribable self—despite the metaphorical assertions of *The Bhagavadgita* X that define it as permeating every level of reality.

The underlying meanings of *atman* and *brahman* defy such nominalization. Sanskrit *atman* means breath, soul, life or self, a clear indication that self-hood was understood as a process – breathing and living for higher forms, self-renewal for organic components.⁴³ *Atman* is etymologically linked to other Indo-European cognates, most notably Greek *atmos*, vapor, air – the foundational source of energy essential for breathing and living, thus emphasizing the self as process rather than product. These connotations are clear for *brahman*, too: Nikhilananda notes that the word traces to the Sanskrit root meaning 'to expand'; ultimately *brahman* traces to the Indo-European root *bheu*, 'to swell', a feature of growth.⁴⁴ The meaning seems to be that Self, whether *atman* or *brahman*, is basic to the autopoietic – the self-creating, self-making, growth process from atoms to the most complex structures of present reality: psychological, social, political, imaginative.

40 Edmund Sinnott, *The Biology of the Spirit*, New York: Viking Press, 1955, p. 123; Jantsch, *The Self-Organizing Universe*.

41 Humberto Maturana and Francisco Varela, *Autopoiesis and Cognition*, Dordrecht: D. Reidel Publishing, 1980.

42 Jantsch, *The Self-Organizing Universe*, pp. 33, 40.

43 Arthur MacDonell, *A Practical Sanskrit Dictionary*, London: Oxford University Press, 1929, p. 38.

44 Nikhilananda, *The Upanishads*, p. 31. Calvert Watkins, ed., *The American Heritage Dictionary of Indo-European Roots*, Boston: Houghton Mifflin, 1985, p. 5.

In a highly revealing passage Varela writes of ‘the emergent self’: ‘It is clear that molecules interact in very specific ways, giving rise to a unity that is the initiation of the self ... emergent coherence is what constitutes the self at that level’. In a remarkable passage, Varela forges the unity between any higher notion of a self or soul – or *atman-brahman* – and more fundamental autopoietic process in the path *from atoms to atman* – the emergence of spirit: ‘I don’t have one identity. I have a bricolage of various identities. I have a cellular identity ... I have a cognitive identity. I have various identities that manifest in different modes of interaction. These are my various selves’.⁴⁵

Varelas’ language is not quite metaphorical, but close: it could be Krishna the charioteer speaking to the warrior Arjuna, describing his ‘various identities ... various selves’ in the twilight before the dawn on that fateful morning before the greatest battle ever waged. In the Hindu vision, a transcendent spirit underlies the most diverse and tragic divisions of life: a supreme spirit, *atman-brahman*, a creative universal emergent self in every human being. For the Hindu, recognition and realization of this growing self brings enlightenment.

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45 Francisco Varela, ‘The Emergent Self’, *The Third Culture*, ed. John Brockman, New York: Simon & Schuster, 1995, p. 211.