A Critical Study of the Relationship Between Science and Advaita Vedanta as Understood by Swami Vivekananda

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ABSTRACT

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Swami Vivekananda's writings have plentiful allusions to the relationship of Advaita to the science of the day. This thesis studies his conviction that Advaita Vedanta and science were mutually supportive by looking at his ideas on the correct ways of knowing, on the meaning of unity, on the nature of reality and of matter and on the special potential of Raja Yoga. Because of the changing nature of scientific knowledge, the thesis attempts to study how well his ideas reflected the state of science in the 1890's when he wrote.

His belief that Advaita Vedanta was a scientific religion allowed him to promote Hinduism as the universal religion for the future and to champion its traditional, sometimes despised, past. This, and the fact that it helped to distinguish him from other more prominent Indians, was evident at the outset of his public life in Chicago..

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CHAPTER 1

INTRODUCTION

Swami Vivekananda's public career began at the World Parliament of Religions in Chicago in 1893 and closed with his death at the age of forty two years later in 1902 [1] During this time he lectured extensively in India, England, Europe and most especially the United States. In this nine year period he made two Western tours, the first from May 1893 to December 1896 and the second from June 1889 to November 1900.[2] He touched on all aspects of the Advaita Vedanta philosophy he espoused - its history, the Karma, Bhakti, Jnana and Raja Yogas, its relationship with other religions - and a certain theme recurs in much of it. This is his belief that Advaita has a special relationship to science. This relationship is the subject of this thesis.

I have confined this study to a critical exploration Swami Vivekananda's presentation of the relationship between Advaita and science making particular reference to some of the ideas of science and about science in the late nineteenth century This allows us the possibility of judging the extent to which his thought was in tune with the thought of the day in this area and to what extent it was not. The rate of scientific advance throughout the nineteenth century was phenomenal and unprecedented. What had been reasonable at the beginning or in the middle of the century was not necessarily so by the end

of it. And that was not all, for soon after Vivekananda's death the world of Physics was to introduce the ideas of relativity and of quantum mechanics which would dismantle the nineteenth century certitudes of the ether If we are to judge the reasonableness of Vivekananda's views, then, we must see them first of all in the light of his own time and not of an earlier or later one when the knowledge and idea base was so different.

I attempt neither to investigate the source of his scientific knowledge nor the sources of his ideas generally. That area of study, while difficult, may eventually prove rewarding in further illuminating Vivekananda's thoughts [3] Furthermore, I shall not try to divine any chronological development of his ideas. In the Collected Works, not all the papers are dated and some of the important ones may have been edited for publication; he certainly did rework some of Raja Yoga for the purposes of publication [4] This would make a chronological study hazardous. In addition, his talks and lectures were not intended to be formal philosophical discourses such as might be given in a University course but were persuasive presentations of great rhetorical skill designed largely to awaken the spiritual sensibilities of the West, to promote the Advaitic philosophy and to reveal the dignity of India. The task would be made more difficult by his very scant references to thinkers, both scientific and philosophical, whom one might expect and suspect had an influence This again would arise from the type of lecture he gave in which scholarly references would not have been appropriate. The audiences were diverse and numerous

ranging from the small but committed to the large and questioning, from European to Indian and American These facts alone would tend to introduce diversity into his presentations although not in the ideas. While the presentations do vary a little, there is no obviously clear development of ideas relating to science and Advaita in his papers. During the short span of the Swami's public life, he was constantly pressed financially, travelled indefatigably, had to face the organizational demands of followers in India and the West, and all this in the face of declining health. Given all of this, it is not surprising that a development of ideas on this aspect of his philosophy does not seem to appear.

For now, the critical study of the role of science in his philosophy as seen through his papers and viewed in the scientific context of the day is a sufficient task

CHAPTER 2

THE WORLD PARLIAMENT OF RELIGIONS

Swami Vivekananda's first voyage away from India took him first of all to the United States where he quickly became involved in the World Parliament of Religions.[1] The Parliament was organised by the General Committee on Religious Congresses of the World's Congress Auxiliary in connection with the World's Fair and a call for participants had gone out in 1891 Despite his long and single minded journey, Vivekananda was not an official delegate at the Parliament; he was a private individual. None the less, when the Parliament got under way in September 1893 with an opening meeting attended by four thousand "eager listeners",[2] he was one of the select group of speakers on the platform. Over the next seventeen days more than one hundred and fifty papers would be given by eminent scholars, pastors, clerics and monks from many of the worlds' religions

The organisers stated ten goals for the Parliament all of which were related to inter-religious harmony. Above all there was the hope that there would be more mutual understanding between theistic religions and that each would come to understand what they all had in common but remain respectful of the differences. It was also hoped that the relationship of religions to the arts and society at large could be explored in the hope of promoting international peace

The global and inclusive nature of the Parliament was obvious although Christianity was, as one might expect, the most strongly represented, and there was about it a muted triumphalism again not surprising given the association of Christianity with the West which was now in the throes of huge material and intellectual advance. However, goodwill and respect for all religions was the major tenor of the Parliament and at the end it was held to have been a great success [3]

The Importance of a Study of the Parliament in an Examination of Vivekananda's Ideas on Science

It was at the Parliament that Vivekananda came to prominence in the West as a proponent of Indian thought and this success became the mainspring for his rise to fame in India. It has been said " Now so far as Vivekananda the prophet is concerned he was America's gift to India" ,[4] and the response of Hindus in India bears this out. Vivekananda had left India as a Hindu 'patriot' intending to seek help for the poor. While he did make one very short, impassioned plea for practical help at the Parliament, this mission largely evaporated as he discovered that his role as the voice, the 'prophet' , of Hinduism in the form of Advaita Vedanta, fascinated the Western audience.[5] In the few years that followed, he spoke to many Western and Indian audiences. He wanted his mission in the West to "bring out the gems of spirituality that are stored up in our books...in monasteries and in forests...".[6] A short study of the

Parliament helps us glean elements of both the Indian and the Western context in which Vivekananda emerged to become such a significant religious force. It will also help us begin to place the role of science in his thought and mission.

Hinduism at the Parliament

The only Indian religious group formally represented at the Parliament was the Brahmo-Samaj but there were other Hindu speakers who gave scholarly presentations, and there were also non-Hindus with experience of India through missionary works . However, it was Vivekananda, alone and representing no group, who was the most unabashed voice for Hinduism. He was surely one of the best speakers at the Parliament. Our reading of his speeches at the Parliament alone suggests that he was a charismatic orator having easy command of speech rhythm by repetition and by controlled sentence length. His expression was clear and simple using parable and metaphor where possible. That he could be a crowd pleaser was noted by the Parliament reporter who said "there arose a peal of applause that lasted several minutes" when Vivekananda addressed the audience as "my sisters and brothers of America".[7] Vivekananda's personal presence, "his fine, intelligent, mobile face....his deep musical voice", [8] assured a firm hold on fascinated audiences throughout his career.

Manilal N. Dvivedi was, like Vivekananda, a follower of the Advaita philosophy. He gave two papers on Hinduism, one devoted to Advaita in particular. Both

papers were thorough, didactic and gave a good traditional account of their subjects While they may well have been enjoyed by serious listeners, they were not at all of a popular flavour.

Speakers for the Brahmo - Samaj were more engaging. Protap Chunder Mozoomdar,[9] its senior representative, was introduced to the Parliament as :

"...already known to many in the assembly, both personally and as author of "The Oriental Christ", and as representative of the spiritual theism, on which the high hopes of many hearts have been fixed in many lands" [10]

Even before the proceedings began in earnest, it seems that the Brahmo-Samaj had an unofficial blessing from the organisers as being the movement encapsulating all that was right in Indian religion. This view was fully shared by T E. Slater, a member of the London Missionary Society, who had been an evangelist to "educated Hindus" in Bangalore and had been head of the High School in Madras In his The Religious Outlook of India [11] he said that the masses of Indians followed the "old Hinduism" which was characterised by the "grossest superstition", exotic practices and idolatry. This "old Hinduism" was without redeeming features He also reported the emergence of the Arya Samaj which had enjoyed increasing popularity in the last ten years, due, he believed to the emergence of ever stronger Indian nationalism. The Arya called for a strict return to Vedic religion which he saw as deplorable, but he also felt this movement had reached its peak and would now decline rapidly. Set against all this was "young India" comprised of college trained young men much influenced by Western thought, not the least component of which was

Christianity Thus, there were "two Hinduisms"; " one holding to the traditions of the past" and " the other living in the present and shaped by outside influences". This latter was represented by the Brahmo-Samaj and it was "the highest and most interesting development in religious thought in the present century outside the Christian Church" . The main achievement of the Brahmo Samaj, in Slater's view, was that it had familiarized India with the name of Christ, and it kept alight his hope that one day India would become the Eastern Church.

Mozoomdar, in his opening address, encapsulated the position of the Brahmo - Samaj. He stressed the continuity of worship in India of the one and only "great living Spirit" and this from an ancient past. He repeated what became a virtual mantra of Indian religionists abroad; that India is "the old mother of nations and religions" being "the ancient among ancients, the elder among elders...".[12] The Brahmo-Samaj was in this great tradition, and no religion was more " in harmony" with all the other religions of the world. Mozoomdar constantly reiterated that monotheism, as preached by the Brahmos, was the true thread of Indian religion and this, of course, meant that idolatry and superstitions were but sullying aberrations. He implied that the Brahmo-Samaj had saved India from its " thirty three million gods and goddesses" [13] The Brahmo-Samaj was a self-described "new dispensation" being some sixty years old. Like the Aryas, the Brahmos claimed authority in the Vedas but they came to see them as not infallible. True to the spirit of universalism, they

adopted all the worlds' Scriptures as being true but, again, not infallible. Mozoomdar detailed Asia's gifts to the world. The first "gift" was the understanding that " nature is God's abode" and "God lives in every particle" so that nature is "the arena of God's personal activity" and "personal will".[14] The "second gift" he held to be the most unique and peculiar to Asia; it is the insight that God could only be found in the individual's own heart through "introspection". The spirituality of Asia is thus the search of the individual spirit to "see God within its own being" and not within the exterior world. This would explain why renunciation is such a characteristic of so much Asian religion.

"What is theology without morality?" Mozoomdar asked.[15] The Brahmo- Samaj had from the first had been active in seeking social justice for the many oppressed in India, they had attempted to deal with the problems of inter-caste marriage, widow marriage and child marriage. The other Brahmo speaker, B.B.Nagarkar, briefly analyzed the roots of social division in India. They lay, he argued, in the decline of 'pure' religion - that is the religion of the ancients. Religious degeneracy had weakened India politically and socially which accounted for its domination by the British Only a return to pure religion could reverse this. He did not hesitate to say that Anglo-Saxon culture had brought "high civilization...education...enlightenment" to India, but he also believed the West had little to offer spiritually and he was concerned that India should "adapt" Western ideas but not "adopt" them. Nagarkar's view of religious

harmony was one of universal tolerance; the road to spiritual growth was, he said, to "Hinduize Hinduism, Christianize Christianity..." .[16]

Vivekananda and Hinduism at the Parliament

Vivekananda agreed with much in the Brahmo's position He echoed Mozoomdar by referring to Hinduism (not India or Asia) as "the mother of all religions" stressing the antiquity and continuity of monotheism in India He too held an attenuated view of the Vedic Scripture saying that God could never be fully realized in any prophet or in any book, and he spoke of the special interiority of Hinduism with its belief in the value of renunciation. Despite these areas of agreement, Vivekananda could not have been mistaken for a Brahmo He emphatically did not believe that Hinduism was in need of a "new dispensation" to move into the future. The Brahmo-Samaj had been presented as being uniquely in harmony with all religions, but Vivekananda declared that Hinduism, unlike any other religion, had always been tolerant; it "has taught the world both tolerance and universal acceptance" readily accepting all religions as true and having offered shelter to religious victims from other cultures throughout history.[17] Hinduism " is the broad, universal church" but further, like the Brahmos, he said, "We believe not only in universal toleration, but we accept all religions to be true".

Schisms and sects had littered the long history of Hinduism, but Vivekananda, again echoing the Brahmos, believed a pure thread had always held. This

pure thread was Vedanta Philosophy. However, in discussing this, Vivekananda's differences with the Brahmo-Samaj became apparent. While he extolled the pure Vedantin thread, Vivekananda flatly refuse to condemn idolatry as an embarrassment to India: "Idolatry in India does not mean horror. It is not the "mother of harlots". It is the attempt of underdeveloped minds trying to grasp high spiritual truths." [18] This is not to say he condoned superstition and convoluted practice, but he was not prepared to cast them aside as valueless. He denied that Hinduism is polytheistic because, he said, worshippers give all the gods the same attributes, which is to say they are the same god This unapologetic and bold defense of idolatry could not have been calculated to gain popularity in the urbane Parliamentary gathering His position on idolatry vividly showed his commitment to India. He would never condemn any characteristically Indian aspect of spirituality. This position also allows us to see his strong predisposition to syncretism. He seemed naturally inclined to look for the possibility of continuity and order rather than to ferret out apparent conflicts

Vivekananda also spoke about the past lives of individuals and how they might be recalled using the correct techniques. Coming from a man who was plainly well educated, authoritative but exotic, this must have been intriguing to those who had never heard of such a thing before. Vivekananda's presentation of Hinduism was far removed from the dry scholarliness of D'vivedi and the civilized balance of the Brahmos.

The Brahmo-Samaj had been founded as a rational religion meaning that it should not offend reason.[19] This important aspect of Brahmoism was not much explored at the Parliament. By contrast, the rationality of Advaita Vedanta appeared from the outset in Vivekananda's exposition. Early in his paper, he claimed that "the latest discoveries of science seem like echoes " of Vedantic philosophy. Several points were made. The Law of Conservation of Energy, he argued, is consonant with the Vedantin position that the universe is eternal, it was not created, it will not end. Reincarnation is "in perfect accord with science" since it explains so much human behaviour. Hinduism is like science because it insists that faith should be based on the "realizing" of God , that is, the direct experiencing of God, and not on the acceptance of theologies and dogmas given in Scriptures or by institutions. Because of this, Hinduism is experimental just like science. Furthermore, "science has proved to me that physical individuality is a delusion .." and this accords with the Advaitic view of the person as being one with all mind and matter in the universe. [20] Advaita is not just rational, it is consonant with every aspect of the method and content of science. Unlike other religions, Advaita Vedanta did not stand bemused and perhaps imperilled by the march of science On the contrary, it could lock step with science for much, if not all the journey , towards the future of unity.

Vivekananda and the Brahmos shared the view that Hinduism had an ancient history of monotheism and interiority; they shared a modified view of the

wisdom of Scriptures; they respected all religions as true and did not seek to proselytize. However, where the Brahmos distanced themselves from traditional, popular Hinduism as manifest in idolatry, Vivekananda defended and saw great value in it; where they recognised an intellectual debt to the West and realised it would require adaptation on the part of Indians, Vivekananda merely went about using the ideas of the West, particulary its science, to strengthen the claims of Advaita and made no suggestion that Advaita would have to adapt, where they were socially concerned and active, Vivekananda's concern in this area was eclipsed by his desire to promote and extol Advaita. The Brahmos call for a "new dispensation" implied that traditional Hinduism in the ninteenth century was infected with error. In none of his Parliament addresses did he ever suggest that Hinduism had taken 'wrong turns'; he made no mention of Western influence on Indian thought in the previous hundred years. Hinduism as presented by Vivekananda was ancient , utterly tolerant to the point of being a universal religion, completely wise and self-sufficient being able to enclose and use the ideas of the West, but not being changed by them. By the end of his main speech, Vivekananda had succeeded not only in defining himself as the unalloyed prophet of all Hinduism, he had also managed to equate this position with the most 'progressive' , rational thought of the West. His religion was apparently more Indian than the Brahmos and more rational than any in the West. He stood in no-one's shadow.

Nagarkar had called for the 'Hinduized Hindu' and this is just how we might

describe Vivekananda.

Religion and Science at the Parliament

On the same day Vivekananda spoke on "Hinduism", several other papers on science and religion were given . This gives some insight into what some scholars were thinking in this area .

Paul Carus writing on Science as Religious Revelation argued against those who believed in the imminent disappearance of religion in the face of scientific rationalism On the contrary, he felt that religion was stronger now than ever before because now there was " a purer conception of religion" [21] He vehemently rejected the idea that scientific truth and religious truth could be different.[22] Such a contention was, he said, "logically untenable ..morally frivolous, irreligious" because "the nature of religious truth is the same as that of scientific truth". This is not to say they are the same. "science is the method of searching for the truth, and religion is the enthusiasm to live a life of truth" Ian Barbour has pointed out that from the time of Galileo onwards there has been an increasing tendency to see science and religion as "strongly contrasting enterprises ".[23] Carus certainly did not feel this to be the case Sir William Dawson, another eminent speaker in this section at the Parliament , also insisted that science and religion could not contrast so much as to be in conflict.[24] Writing in Man's Place in the Universe, he agreed that miracles are a problem for science but in the past many things that had seemed inexplicable except by means of divine intervention could now be explained by recourse to

nature and reason If science had not been all powerful in the past then who could say that is so now. It may well be that so-called miracles can be rationally explained when we discover the means. However, he stoutly maintained, anything that is ultimately irrational cannot stand.

Recent historical studies of nineteenth century thought have shown that the notion that science, particulary Darwinism, and religion were in conflict held ground at the popular and confessional level of religion, particularly among those later termed 'fundamentalist'. These groups perceived science as a threat. On the other hand, others saw religion as a historic force against reason and, hence, science. This view was fuelled by some particularly influential histories of science widely read at the time. However, while the perceived relationship between religion and science in this period was complex, it seems that generally, liberal theologians and both religious and secular intellectuals saw no necessary conflict between science and religion, or, at least, Christianity [25] For them, as for Carus and Dawson, the test of rationality was paramount even if its application could be delayed. They believed that ultimately both religion and science would have to give an integrated world view

For the rest of his public life, Vivekananda incessantly argued for this. The position that Advaita and science were automatically and evidently at one, not only allowed him to extoll India's traditions, but also to suggest that in them lay the religious and intellectual future of the world.

CHAPTER 3

WAYS OF KNOWING

In his translations of Patanjali's Aphorisms, Vivekananda had the opportunity to summarise Indian ideas on ways of knowing. These ways are, according to Patanjali: "Direct perception, inference, and competent evidence ."[1] The interplay of these three, and their relative value, is one which Vivekananda touched upon repeatedly especially when the subject of Advaita and its relationship to science arose

Competent Evidence

The Vedas were for Vivekananda the repository of spiritual wisdom, and like all Hindus, he revered them. However, he did not look to them as an absolute source of teaching or dogma but rather as a guide Hindu faith did not rest on dogma or the wisdom of others, but it must rest upon the personal, direct experience of the truth: "The Hindu religion does not consist in struggles and attempts to believe a certain dogma, but in realising - not in believing , but in being and becoming",[2] he told the Parliament. His view of the Vedas was a liberal one. He was reluctant to view them as a closed canon. The Vedas might be a set of inspired texts but they should be thought of as an organic canon, capable of growth:

"But by the Vedas no books are meant. They mean the accumulated treasury by different persons at different times. Just as the law of gravitation existed before its discovery, and would exist if all humanity forgot it, so it is with the laws that govern the spiritual world."[3]

The "persons" referred to here are "Aptas", or Rishis, that is to say they were individuals who could be considered true guides because they had been "inspired" to true insight, or as Vivekanand elaborated, they had "attained" this knowledge not from some outside agency, but from inside, "from the man himself" [4] Their recorded testimony, or competent evidence, could be relied upon for guidance, as a map: "books are good but they are only maps"[5]. Like a map, they could not reveal the truth but only locate it and hint at its quality. Apprehension of truth or reality had to come from the same attainment experience that the Apta or Rishi had had.

The spiritual laws exist just as do physical laws, and they had to be investigated and approached in the same general ways. Just as scientists did not readily believe whatever they read in a book, so a pursuer of religion should not depend upon what appears in a book. This, he believed, was something that Advaita had in common with science to a degree that no other religion had.

Scepticism about traditional, handed-down knowledge was, he maintained, a hallmark of scientific knowledge and method.

He was, of course, right about the essential scepticism of scientific method. However, the relationship of Hinduism and Advaita to scripture was not quite that of science to tradition. Vivekananda was arguing that the scriptures were a record of the spiritual attainment possible to those who followed the right path

and practice. Followers could not hope to do more than the Rishis or Aptas had done; they could only hope to repeat it for themselves By contrast, all records of scientific ideas and doings must be repeatable (this is a cornerstone of scientific method), but repetition alone is not the way of science The scientist takes the findings of others as a new starting point from which further ideas can be developed and new things discovered This brings out an important difference between relgion and science, as Vivekananda saw it The individual can attain the knowledge, or the experience of reality, as did the ancient prophets and once he or she has it , has it all. There is no suggestion that the knowledge or experience changes with time or with individuals. Moreover, the pursuit and attainment of this Samadhi is a highly personal and individual enterprise however much it may be helped by the guidance of others The pursuit of Samadhi is ahistorical and Samadhi is, itself, ahistorical This is not the case for science; scientific knowledge and method are historical Science has a history having progressed from lesser knowledge and skills to more and better knowledge and skills, and continues to do so This progress has occurred because of some particular individuals, but they have always built on the ideas and work of others The historical, collegial and social nature of science are among its essential qualities For Vivekananda, true religion may be enhanced by these but it does not rest upon them

The Limits of Reason

Patanjali's forty-ninth aphorism says,

"The knowledge that is gained from testimony and inference is about common objects. That from the Samadhi just mentioned is of a much higher order, being able to penetrate where inference and testimony cannot go".[6]

Vivekananda had no disagreement with this, commenting upon it:

"Reason leaves us at a point quite indecisive: we may reason all our lives, as the world has been doing for thousands of years, and the result is that we find we are incompetent to prove or disprove the facts of religion. What we perceive directly we take as the basis, and upon that basis we reason So it is obvious that reasoning has to run within these bounds of perception. It can never go beyond. "[7]

The picture of reason, and of science, being bounded as by a finite circle is drawn:

"The field of reason, or of the conscious workings of the mind, is narrow and limited. There is a little circle within which human reason must move. It cannot go beyond Every attempt to go beyond is impossible, yet it is beyond this circle of reason that there lies all that humanity holds most dear."[8]

The great difficulty with the world of reason and science is that it deals only with probabilities not with absolutes or, as he said, "facts", and a 'fact' is something held, above all, by the senses and not by the mind alone .[9] A fact must be a 'felt' or experienced truth, but this is not to say it could be in sustained conflict with reason, far from it. This experience, higher truth - inspiration - may go beyond the reach of science but: "The first test of true teaching must be that the teaching should not contradict reason".[10] This gives a picture of reason acting as the police or border patrol for inspiration which, it seems to be implied, may be a little unruly at times. It also speaks to the

notion that knowledge must be continuous and self-consistent; there must be correspondence between one way of knowing and another. We recall that Carus and Dawson at the Parliament held firmly to this same idea which had certainly not been shared historically by all Christian theologians. Vivekananda's idea of what was meant by reason and science was clear Reason and science were, above all, the application of inference to the world of experience.

Inference

Traditional Indian logic had much to say about inference, but I will confine this discussion to Vivekananda's own views. Inference, he said, is "knowledge, in which we go from the less to the more general"[11] and the process of generalisation leads to the formation of laws[12]. Humans are inveterate categorizers, with minds being full of "pigeon- holes .... and whenever we find a new thing the mind immediately tries to find out its type in one of these pigeon holes", and thus " knowledge is more or less classification" [13] This 'pigeon-hole ' characteristic of the mind is inherent. In fact, all knowledge is inherent and the process of learning is not one of acquisition but of recollection or realization of what is already known·

"The external world is simply the suggestion, the occasion, which sets you to study your own mind, but the object of your study is always your own mind. The falling apple gave the suggestion to Newton, and he studied his own mind. He rearranged all the previous links of thought in his mind and discovered a new link among them, which we call the law of gravitation. It was not in the apple nor in anything at the centre of the earth.[14]

This classic Platonic statement of knowledge is the only one Advaitins can sensibly uphold since the mind, all mind, spirit and matter are said to be one. In which case, learning is not the discovery of a fabric of relationships ' out there' ; it is not a process of acquisition. Learning is a process of self-discovery and never anything else because there is nothing alse. It is a process of realising that one always knew it, of realising that the 'person' and the knowledge are not and never have been separate. This pigeon-holing of knowledge was, as we shall later see, very powerful in Vivekananda's own reasoning appearing as extensive use of analogy.

However, inference has its limits. It is essentially descriptive and probablistic. Inference from past experience and from analogy may indicate what is going to happen and when, but it will not necessarily tell us why. Simply put, inference addresses the what and the when of phenomena but not the why of them. It does not address causality. While Vivekananda did not say this, he acknowledged it by speaking of a second way of reasoning. "A second explanation of knowledge is that the explanation of a thing must come from inside and not outside itself."[15] He illustrated this by thinking of a stone thrown up by a man which then falls down, not "because some demon dragged it down" as might have been suggested in the past, but because of something in the nature of the stone itself. The postulated demon may bring the stone down, or it may, on a caprice, not do so. Let us examine this a little more. The falling stone is near the earth, therefore it will move towards the earth

eventually simply because it and the earth both have mass. This is what Newton's Law of Universal Graviation tells us. It is not a matter of a ghost or demon observing the stone and deciding that he/she must move it. Those who resort to demon type explanations are resorting to an external agency as the cause of action or change in the system of the earth/stone. Implied in this positon is the idea that any change in a system can arise only by an external agency and not from within the system itself. Vivekananda could not accept that systems cannot be self-changing or self-evolving, and he believed that science fully attested to this. The stone falls because both it and the earth have mass. If the mass of one of them changes, the behaviour of the stone will change too. The cause of the attractive motion is due to the mass of the object and mass is a property of the object, so the cause of the motion can be said to be in the objects.

"This tendency you will find throughout modern thought in one word, what is meant by science is that the explanation of things are in their own nature, and that no external beings or existences are required to explain what is going on in the universe....And this is one of the features of science which I mean to apply to religion."[16]

However, the cause of the motion of the stone plainly does not reside solely in itself; it would not move if there were no earth. So, while one can say that the motion of the earth/stone resides within the earth/ stone system one cannot say that the cause of the stone's motion resides solely in itself, as Vivekananda wanted to say.

This type of internal explanation was, he felt, most wonderfully demonstrated in the process of evolution:

"The whole of evolution is simply that the nature of a thing is reproduced, that the effect is nothing but the cause in another form, that all the potentialities of the effects were present in the cause, that the whole of creation is but an evolution and not a creation. That is to say, every effect is a reproduction of a preceding cause, changed only by the circumstances, and thus it is going on throughout the universe and we need not go outside the universe to seek the causes of these changes; they are with us."[17]

Vivekananda has arrived at an important point, one where he wants to be: whatever happens in the universe is never the result of extra-terrestrial or supra-universal force. The force of cause must be within the universe, and this means that there cannot be a separate Creative force acting. There is no Creator God. More than this, there is absolute identity of cause and effect: "the cause, the highest (Brahman), the ultimate primal cause must be the same as the lowest and most distant of its effects, a series of evolutions".[18] This seems to hold together well, but if we think back to the falling object we can see a potential problem

The motion of the stone is an effect resulting from the cause of two masses being near to each other. The resulting motion is one of uniform acceleration, the stone and the earth picking up speed as they get closer to each other. In the unlikely event that the earth suddenly disappears, the stone will cease to be accelerated but it would not stop moving, its speed now being constant. The effect of acceleration would have gone but not of motion; this is Galileo's and

Newton's Principle of Inertia. The stone is changing its position from instant to instant but nothing is causing this to happen that science is prepared to guess at. It seems, in this limited way at least, things can change with neither an internal nor an external cause; an effect can occur about which science can relate to no cause.

At the same time, Newton's Second Law of Motion specifically states that if a body, such as the stone, is to change its motion, not just position, it must be under the action of an external force. The stone itself cannot effect that change; there can be no internal force to effect this. So, while it is true that the falling of the stone is due to the fact that it has mass, this possession of mass is a necessary but not sufficient condition for the motion of falling; the cause partially inheres in the stone but does not fully inhere in it The earth is an essential component in the falling motion because the motion is in relation to it. This points to the difficulty of knowing what constitutes a closed system, that is one in which everything can be explained by causes within the system So far as the motion of the stone is concerned, it cannot be explained by reference to it alone · it is not a closed system - but it can be expained by reference to the earth/stone system as a closed system.

There is also some need to ponder initial conditions. The stone was thrown upwards in the first place and, in this case, it was done by a person who was outside the stone. It could be said that the person set up the initial conditions in which we would then see the falling due to gravity. It need not have been a

person - an explosion, a volcano, an earth-quake would have had a similar effect. But the agency by which initial conditions are set does not have to be the same as the cause which then takes over and it does not have to inhere in the object at all; the person does not cause the stone to fall. This seems to leave open the possibility that this Universe could have been initialised by something not inside it but which then 'let go' and left it to move under its own internal forces. This implies that our Universe is a single , closed system which does not necessarily contain all the matter, mind, spirit there is. This brings us to a clash of definitions. If we allow that that our Universe must simply be a closed system in which all effects arise from internal causes then such a limited universe, perhaps one of many, is possible. The behaviour of matter, mind and spirit which we observe may apply to this unverse only. However, if one takes the word 'universe' to mean the sum of everything, including all sub-universes, mind, matter and spirit, then it is a logical impossibility for anything outside of it to have initialized or created it. The thoughts and findings of science are neither a hindrance nor a help to this position. This is Vivekananda's view, and although it seems to me to need no science to support it, he none the less felt it gained much from science In particular, he maintained that the theory of Evolution underscored the unity of all creatures.

Contemplating the oneness of all, he was moved to say " You are the same as that little worm there;.....you are the same."[19] Whether scientists would have generally agreed with this is doubtful. In concluding the Origin of Species,

Darwin was cautious in suggesting that all species had descended from just one progenitor, while obviously being attracted to the idea of it :

"I believe that all animals have descended from at most only four or five progenitors, and plants from an equal or lesser number. Analogy would lead me one step further, namely, to the belief that all animals and plants have descended from one prototype. But analogy may be a deceitful guide. Nevertheless....I should infer from analogy that probably all the organic beings which have ever lived on this earth have descended from some one primordial form, into which life was first breathed."[20]

It has to be added that for all this speculation on the small number of original organisms, his theory of Natural Selection was pre-eminently about the process of differentiation, of how organisms became increasingly separate from each other. The unity or singularity to which Darwin referred is an historical one. To agree that a worm and a human have a shared history was not to say they are the same now. A process of differentiation logically required an initial reference of relative non-difference and thereby the theory of Natural Selection, of necessity, referred to primordial sameness if not unity, it was this primordial unity that horrified Biblical fundamentalists and delighted Vivekananda But Natural Selection's direction was away form this, showing time's arrow, that is progress, to be towards differentiation not unity. For Darwin

"There is grandeur in this view of life, with its several powers, having been originally breathed in to a few forms or into one; and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being, evolved."[21]

This seems to be an open, endless system which will not come to an end on its own. Vivekananda did not believe this; for him there was no such thing as an

infinite process. Mathematics holds, he said, that there is no such thing as an infinitely long straight line; eventually that line becomes a circle[22] and the same is true of all processes. This is why we see the operation of cycles in nature Evolution must come to an end under its own weight. Life, he said, is "power" trying to express itself. The amoeba, an early form of this power, had to evolve to overcome its environment and that struggle led to the evolution of humans. Eventually, the 'power' will "have conquered all the obstructions nature can bring before it", and it will no longer have to struggle, no longer have to evolve. [23] Presumably, by then all competing life forms will have converged into one dominant one and hence, so far as life is concerned, non-difference will have evaporated and unity will have been achieved. The environment will have to have truly been subdued because any change in it would invite changes in the organism and this would mean that a true endpoint or closure had not been reached.

Conclusion

Reason and science deal, as Patanjali said, with "common objects" and have little to do with inspiration. This meant that although he could argue that reason and science were the true Western soulmates of Advaita, they were much more limited in their possibilities Vivekananda argued that science's attitude to handed-down knowledge and dogma was essentially the same as that of Advaita. I have suggested that there is some significant difference. He argued

that science has shown that any action or effect must arise from within the object or system in which it appears and that cause and effect are actually the same thing. I have indicated that science is more cautious about this and that care has to be taken in how the system is defined. Vivekananda believed that the theory of evolution attested to the unity of all creatures, but we have seen that while it did indeed perceive a primordial unity, this unity was seen to evolve to progressive difference. He drew strength from science, and not unreasonably so, but science is far more cautious than he was in the leap to generalisation.

Vivekananda never did suggest that science and Advaita were effectively the same, but it was the their common ground upon which he dwelt in the main and this was particularly the case when he advanced his understanding of Unity.

CHAPTER 4

ADVAITA VEDANTA - THE " SCIENTIFIC RELIGION"

" I may make bold to say that the only religion which agrees with, and even goes a little further than modern researches, both on physical and moral lines is the Advaita, and that is why it appeals to modern scientists so much". [1]

This claim of Vivekananda's that Advaita was and " can be the only scientific religion"[2] had been a constant theme from his Parliament address in 1893. In 1896 he received much encouragement for this view from Nikola Tesla, the renowned inventor of the electrical induction motor,[3] who had attended a lecture of Vivekananda's and was afterwards "charmed to hear about Vedantic Prana and Akasha and the Kalpas which according to him are the only theories modern science can entertain." [4] Tesla told Vivekananda that he had been working on a theory to unify force and mass in terms of energy and that he believed he had now succeeded in showing this mathematically. Vivekananda was invited to discuss this with him the very next week. What the outcome of this meeting was, we do not know, but Vivekananda was excited by the momentous prospect of Tesla's work because he believed that it would make Advaita Vedanta secure: " In that case, the Vedantic cosmology will be placed on the surest foundations" . The optimistic tone of these words shows Vivekananda's unwavering conviction that the Western science of the day and Advaita Vedanta would, together, be able to describe the physical, spiritual and

moral universe as a coherent whole. The basis for this belief seemed to rest on two claims he made repeatedly. The first that science and Advaita had the same goal - "Unity"' - and the second that of all religions, only Advaita could be said to be scientific in any degree. This last claim rested upon his insistence that direct 'experience ' of God is alone the proper the ground for belief in God This 'experience' cold be achieved by methodic pursuit of a 'scientific' path, namely that of Raja Yoga. Whether these claims as to the scientific nature of experience and of Raja Yoga stand up, we shall leave until later, concentrating for now upon the pursuit of the unity claim.

A study the "unity" claim comes first because it not only shows much of what Vivekananda saw science to be, it also allows us to study his presentation of Advaita and that, of course, was his primary concern.

Unity :Akasha and Prana

"Science has proved to me that the physical individuality is a delusion, that really my body is one little continuously changing body in an unbroken ocean of matter; and the Advaita (unity) is the necessary conclusion with my other part, soul".[5]

Let us consider this. Science , he believes, has shown that "physical individuality is a delusion", that is, there is no real difference from one so-called body to another. The differences are only apparent, not real. Advaita holds that the differences we see in the universe are mis-perceptions because the real or ultimate nature of the universe is that of non-difference, non-duality

Force, matter, energy are all one.

In The Vedanta Philosophy after briefly outlining the other Vedanta philosophies, Dvaita (dualistic), Vishishadvaita (qualified non-dualistic) , he discussed Advaita (non dualistic) at some length introducing the concepts of Akasha and Prana. Akasha is the basic material of the universe and it started out as "fine" and undifferentiated; it was "potential" only. Prana is the primordial undifferentiated force or energy; it is the elemental "power" which acts on Akasha to make Akasha become increasingly "gross" and to be differentiated into gases, liquids, solids. plants, and all living thing including people. Prana also develops and becomes "gravitation", "magnetism", "nerve currents" and "thought force"; it becomes all and any force in the physical and mental world. [6] Thus the interaction of Akasha and Prana causes the evolution of the inorganic world and the evolution of the living world according to Darwin's theory of Natural Selection. But eventually it also produces "involution" by which all this differentiation disappears and Akasha and Prana return to "fine" and undifferentiated states. [7] However, Prana and Akasha are not the ultimate categories; they can be resolved into Mahat or "universal thought power" [8] or "intelligence" [9]. Now the idea of unity comes in; "This Cosmic Mind does not create Akasha and Prana, but changes itself into them" [10]. Vivekananda constantly looked for analogies and parallels between science and Advaita and we can see that the Prana - Akasha- Mahat system seems to parallel force - matter- energy , at least broadly. However, Mahat is mind, intelligence; its

dimension is essentially mental while energy is a concept developed to explain physical events and its dimension is physical. Close though the parallels may be, Vivekananda did not conflate the Advaitic and scientific categories and this caution would certainly have been followed by scientists

Unity and Uniformity

One might ask how it is possible to know that the highly differentiated universe will return one day to its fine undifferentiated state and then to re-emerge into a new cycle or Kalpa. His paper The Cosmos throws much light on this and on the idea of unity. Central to Advaitic philosophy, and to Vivekananda's own rendering of it, is the Upanisadic aphorism "Knowing one lump of clay we know the nature of all the clay that is the universe".[11] Appearing often in his work, it expresses the idea that to know the whole universe one need only know part, as he put it " the microcosm and the macrocosm are built on exactly the same plan". [12] Analogy is an important and distinct category in Indian logic and is certainly so in Vivekananda's thinking. A small part of the universe must more than mirror the whole of it, it must be like it. This, of course, is logically inherent in Advaita which holds that there are no separate parts and , that being so, there can be no difference between one part and another In addition, even for non-Advaitic Indian philosophy, reasoning by analogy has an honoured role although it comes after direct perception (pratyaksa) and inference (anumana), but before testimony (sabda) in importance Upamana

(analogy or comparison) is held to be valid so long as the similarities are judged to be "essential" and not "superficial" [13] The importance of analogy in understanding and knowledge appeared in his discussion of the philosophy developed by Kapila This philosophy, said Vivekananda, was "the first rational system that the world ever saw" (predating Pythagoras who is said to have studied this in India) We have already looked at this discussion of pigeon-holing of knowledge which says that: " Knowledge is the finding of similars" [14] As we study Vivekananda's search for similars, we will have to try to judge how 'essential' they are. Consider this extract from his Cosmos paper:

"Take up a little plant and study its life, and we know the universe as it is. If we know one grain of sand, we understand the secret of the whole universe. Applying this course of reasoning to phenomena, we find , in the first place, that everything is almost similar a the beginning and at the end. The mountain comes from the sand, and goes back to the sand; the river comes out of the vapour and goes back to vapour; plant life comes from seed, and goes back to the seed; human life comes out of human germs and goes back to human germs The universe with its stars and planets has come out of a nebulous state and must go back to it What do we learn from this? That this manifested or grosser state is the effect, and the finer state is the cause". [15]

The idea that differentiated forms emerge from undifferentiated ones and then go back to their original, but not identically the same, undifferentiated state is clearly exampled here. The idea of cycle, but certainly not circle, is fundamental. Both the notion of cycle and undifferentiated origins were fundamental to Hindu cosmology from ancient times [16] Vivekananda was perhaps a little free with the examples he drew on. While no one would argue with the cyclicity of living things as he describes it , the strict cyclic return of the universe to its original nebulous state is not as obvious as the cyclicity of living

things; nor is it clear that mountains always emerge from sand. Vivekananda had certainly found 'similars' here but we wonder how 'essential' they are. The gross plant expands from the tiny seed which is surely quite different from the development of the gross universe. The Nebular Theory of the universe, to which he alluded, held that the Sun was once a huge, diffuse, hot gas from which the planets slowly appeared by condensation The plant growth process is development by 'expansion' while the solar system has developed by 'contraction' and condensation [17] This points to the difficulty of analogy as an ultimate form of reasoning - how do we know where 'superficial' ends and 'essential ' begins? Analogy must also overlook the apparently glaring differences. For example, a water pump may be said to be analogous to a human heart. This analogy is often used, but it is understood to be limited only to the observation that both pump liquid around a closed system. Important differences exist, the fuel, in the form of oxygen and minerals, keeps not only the body alive but also the heart itself , and is carried in the blood which the heart pumps. It pumps its own fuel. The fuel to keep the water pump going is not carried in the water. The heart pumps to live and lives to pump; the water pump just pumps what could just as well be alcohol as water. Analogy is plainly powerful as far as it goes, but the trick is to know just how far that is Science and knowledge in the nineteenth century became more differentiated and specialized, scientists were as much concerned with difference as with similarity. While no-one could avoid the use of analogy (it seems so much a

part of human thought) scientists were wary of it; as Darwin said, analogy can be a "deceitful guide".[18]

There is yet another important strand in his thought here and that is his belief in the principle of "Uniformity" a concept which appears throughout all his work: "Uniformity is the rigorous law of nature; what once happened can always happen "[19] The argument of "Uniformity" had achieved scientific importance and prominence in the middle of the century in the seminal geological work of Charles Lyell in his Principles of Geology (1830 - 33). The title page of this work perfectly summarizes the principle of Uniformity: "The Principles of Geology, being an attempt to explain the former changes of the earth's surface by reference to causes now in operation".[20] This became known as "Uniformitarianism" Lyell claimed that the Earth's geology could be explained as resulting from processes and events that we can observe today and furthermore the rate at which these events occurred had never changed; there was both uniformity of cause and effect. This principle of Uniformity had emerged as a pragmatic method of analytical investigation in geology; if ancient formations could be accounted for convincingly by means of known causes why should we seek causes about which we know nothing in practice? However, much as scientists knew it to be a tool of explanation, some of them tended to allow it to take on the power of a natural law. There were degrees in the Uniformitarian position with some believing that only the causes we now see in action could ever be used to account for geological phenomena and

others being prepared to resort to catastrophes of unknown origin as a valid form of explanation. Lyell's work was especially important to Darwin The idea that slow, gradual change could cause massive geological change encouraged him in the idea that small changes in living things could eventually add up to be very significant in the specie's ability to survive. However, Darwin did not subscribe to strict Uniformitarianism since this would not, he felt, have been able to account for the sometimes apparently rapid emergence of entirely new species . Conditions could not have always been constant because the new species themselves change the conditions of life and competition for others So, the principle of Uniformity had been used with brilliant success in geology and a related field, evolutionary biology. However, the Uniformity was not the *same* Uniformity in each case Geology spoke of the Uniformity of rain, wind and ice upon the erosion of hillsides; biology spoke of the Uniformity of Natural Selection in ensuring that those best adapted to their environment survive and go on to produce more of the same Darwin had seen this same effect occurring in the artificial selection wrought by breeders of domestic animals; selection by the environment or by breeders did bring about change in animals. However, natural selection of the fittest cannot be applied with any sense to rock formations. Even those who most strongly believed in the power of Uniformity did not claim that parallel processes applied to all systems and while they may have believed that each system had its own inherent uniformity they knew that it was excessive to claim this as a natural law However, it can

reasonably be said that everyone would agree to a Principle of Uniformity that held that given the same conditions and causes, the same effects must arise. When we analyze the seed/plant analogy, which I have quoted, we will see that Vivekananda is not so restricted in his view.

Vivekananda discerned in the seed/plant and mountain/sand the pattern of the cycle," so rising and falling, the cycle goes on....The same law must apply to the universe as a whole. because of its uniformity."[21] The seed/plant was developed further. Consider a tree A seed comes from a tree, its " father", and must rest in the soil for a while after which it breaks down (degenerates) and then a seedling sprouts (regenerates). "In the beginning, the whole of the universe has to work likewise for a period in that minute form, unseen and unmanifested, which is called chaos, and out of that comes projection".[22] Just as the seed was the " fine form out of which the big tree comes" so , "the whole universe was present in the cosmic fine universe" and " the little cell, which becomes afterwards the man, was simply the involved man and evolved becomes as a man".[23] Every thing that develops as a gross form was originally contained in the fine 'seed'. Because the universe has evolved from Mahat, intelligence and mind have always been present but not necessarily manifest His discussion in The Cosmos does not detail the steps of universal evolution, but simply draws the parallel between plant growth and cycle and the universe including all material and spiritual elements. The thrust of his argument is that if this happens in the plant world and the animal world it must

happen in the universe as a whole. This is an argument of extreme Uniformity. It is based upon the clay aphorism of the Upanisad and echoes the principle of Uniformity as developed by nineteenth century geologists and evolutionary biologists. The clay aphorism is a powerful mainspring for this ultra-Uniformitarian view. However, it greatly over reaches the stretch of the scientists because Vivekananda is claiming that the *same* kind of Uniformity exists in all systems, plant, animal and inorganic, and he is claiming it to be a law of nature , which no serious scientist would do Science had discovered many laws which could not be uniformly applied everywhere to all matter. For example, a magnetic north pole attracts a magnetic south pole but it repels another north. The force of attraction or repulsion is inversely proportional to the separation squared. Does all naturally occurring force act this way? Not at all it seems. Gravity also follows an inverse square relation but it never repels, only attracts. What of Uniformity here?

The idea of Uniformity is not and was not a 'law' in science, but a guiding, suggestive principle deriving from the application of Occam's Razor, "It is vain to do with more what can be done with fewer", which means as Bertrand Russell said, "if everything in some science can be interpreted without assuming this or that hypothetical entity, there is no ground for assuming it "[24] Even strict Uniformitarians did not acknowledge it as a law of nature in the same way they might see the law of gravity as such. However, for Vivekananda it is a law of laws - a meta-law. We can guess how

Vivekananda's view of the "Law of Uniformity", as he called it, might have been received by science if we consider T.H.Huxley's caution on the whole matter of physical law, let alone meta-law. Huxley doubted the objective existence of physical laws:

"... a law of nature, in the scientific sense, is the product of a mental operation upon the facts of nature which come under our observation, and has no more existence outside the mind than colour has".

He goes on ,

"The tenacity of the wonderful fallacy that the laws of nature are agents, instead of being, as they really are, a mere record of experience, upon which we base our interpretation of that which does happen, and our anticipation of that which will happen, is an interesting psychological fact."[25]

For Huxley, a law was a short hand way of describing what we observe; a way of ordering information. We arrive at laws through inference about things experienced and observed, a process he saw as problematic. It may be an absolute property of the universe, but we could not know that for certain. Huxley did not doubt that the universe was ordered along certain principles but he did doubt that the human mind was as yet in a position to generalize about them with confidence.

"We have succeeded in finding out the rules of action of a little bit of the universe; we call these rules " laws of nature", not because anybody knows whether they bind nature or not, but because we find it is obligatory on us to take them into account, both as actors under nature and as interpreters of nature".[26]

It is fair to say that not all scientists would have been quite as cautious as Huxley, but as we will see later, the state of science in the late nineteenth century was in such a state of flux despite its huge successes, that many would

have agreed with him. If this were true of physical law, how much more true must it be for a meta-law? Vivekananda attached far greater firmness and scope to the idea of Uniformity than any scientist of repute would have dreamed of doing.

However, it is not surprising that the Uniformitarian idea should so appeal to Vivekananda for, as Hooykaas[27] showed in his study of nineteenth century geology and theology, the attitudes that scientists had toward Unformitarianism were often largely coloured by metaphysical considerations even if they did not go so far as to apply it on the grand scale we see in Vivekananda.

Unity and Energy

This was not the end of Vivekananda's use of science to give weight to the notion of cyclicity in the universe in The Cosmos. One of the major intellectual achievements of the century was the development of the Law of Conservation of Energy: this was monotonously recognized by those evaluating the achievements of this accomplished century. Vivekananda says

"If the law of conservation of energy is true, you cannot get anything out of a machine unless you put it in there first ", and goes on, "The amount of work that you get out of an engine is exactly the same as you have put into it in the form of water and coal, neither more mor less ..... It is only a question of the change and manifestation".[28]

In a closed system, energy cannot be created and it cannot be destroyed Consider the plant/universe analogy in terms of energy. A tree can only grow if the seed existed, but the seed is a necessary not a sufficient condition for the

tree because we know the tree must have certain conditions of light (energy) heat (energy) and nutrition (energy) in order to grow. The seed defines the general tree which *may* grow but it does not define the particular tree that *will* grow. The tree is not itself alone a closed energy system; it must absorb and radiate energy in order to survive and the sum of energy absorbed,used and radiated must be zero The tree and its environment form a closed system. This accords with the machine Vivekananda has just spoken of and it is easy to understand How do we apply this to the whole universe? How does the entire universe go from the seed state to the fully evolved state? We have already seen that the Advaitic Universe is singular and therefore closed; it is the source and user of all energy. It cannot take in energy because it already contains all the energy there is and it cannot give it out because there is no "out" to give it to The Universe is a truly closed system but the tree is not. This is a fundamental difference so far as energy considerations are concerned. Vivekananda did not discuss this, and it is indeed a difficult problem which we could hardly expect him to have satisfactorily answered. Had he tackled this, it is unlikely he would have spoken of the universe solely in terms of energy because , as we have seen, it is evolved out of Mahat - mind; the universe has not only matter and force but also intelligence. Mind, soul, matter, force and evergy are all one. In the Advaitic system , the plant could be not be seen only in terms of energy but it would have to be seen in terms of Mahat. Vivekananda did express a conservation principle: "Everything exists through

eternity and will exist through eternity; the created is a form of the creator and the finite is the form of the created as expressed in time", [29] but we do not know just what it is that is conserved here He has fully accepted the Principle of the Conservation of Energy, but does he hold another separate conservation principle in addition to this or does he simply believe that the conservation of energy must imply the conservation of Mahat? Since Advaitic theory has it that force and matter emanate from Mahat, and are Mahat under different forms, it seems reasonable to think that Mahat and energy are effectively the same, but Vivekananda never said this. The plant/universe analogy breaks down because one is a closed system and the other is not and this is not trivial. The situation would not be improved if the conservation principle applied to Mahat or anything else, since any substance can only be conserved in a closed system and not in an open one. If Vivekananda had been arguing from analogy alone, the dislocation would not be quite so serious, but he is also arguing from the 'Law of Uniformity' which means that the plant is not just like the universe. It is a microcosm which mirrors the universe The use of analogy, of the principle of Uniformity and of the conservation of energy sounds plausible at first. Two great scientific ideas of the century seem to underpin the idea of ever repeated cyclicity from fine-to-gross-to- fine. However, the argument does not bear up well under scrutiny because he used the principle of Uniformity well beyond usually accepted limits and his application of the conservation of energy (or anything else) is faulty.

Vivekananda has also said that the machine will give out as much work as is put in the form of coal etc. This is strictly true so long as we mean all energy and give no thought to the availability of the energy to do work. But as any engineer in the nineteenth, or any other century, knew only too well no engine ever gave out remotely as much useful work (energy) as the energy put into it. By mid-century, some of the best physicists had realised that this was not merely an inconvenient result of inadequate engineering but a fundamental law of nature which they called the Second Law of Thermodynamics. It holds that while energy is indeed conserved in any closed system, every time energy changes from one form to another, that is when any action takes place, some of the energy becomes heat which is the least usable of all energy forms. All electrical energy can be converted into heat, but only some heat can be turned into electrical energy This means that as time goes on more and more heat is being produced in the universe which means that energy is becoming less and less useful. As Lord Kelvin explained this would lead to the "Heat Death " of the Universe.[30] Not surprisingly, this dismal message did not strike many resonant chords in the optimistic and progressive mind of the century. It was not widely known or understood even by the end of the century and here, Vivekananda seems to have been unaware of this cosmologically and philosophically important scientific principle. However, passages from other papers suggest that he he may have been aware of it.

Writing in Soul, Nature and God, Vivekananda again addressed the involution

of the universe; having reached gross forms it will go back into its fine form and:

"the whole universe is going on this way. There comes a time when the whole universe melts down and becomes finer and at last disappears entirely, as it were, but remains superfine matter. We know through modern science and astronomy that this earth is cooling down, and in the course of time it will become very cold, and then it will break into pieces and become finer and finer until it becomes ether once more."[31]

He seems to refer to the Heat Death scenario , but applies it rather strangely. Why the cooling of the earth should cause it to shatter and then become ethereal is not clear; usually when matter cools it becomes more solid and inert. The only way it would shatter would be by means of some external blow or by very rapid cooling such that the differential cooling of different materials, like water and rock, would cause breaking, but not explosive shattering The object would not shatter by itself. He also says that the universe "melts down", but something only melts when it gets hotter, not cooler Certainly, if something does get hotter it becomes more "fine". We appear to have contradictions here, the earth is getting colder but the universe is getting hotter; both heating and cooling produce finer matter. However, later in the paper Vivekananda indicates that he really does not believe that the progress is the same in all places at all times:

"Some of these philosophers hold that the whole universe quiets down for a period. Others hold that this quieting down applies only to systems; that is to say, that while our system, this solar system, will quiet down and go back into the undifferentiated state, millions of other systems will go the other way, and will project outwards. I should rather favour the second opinion, that this quieting down is not simultaneous over the whole universe, and that in different parts different things go on".[32]

This does not violate the belief in 'Law of Uniformity' since the same laws are acting in all places but due to the various conditions of matter, different processes result. His words here reflect a concern that was beginning to emerge in the 1890's in science and philosophy, namely, that if the whole universe is winding down and becoming less orderly, why do we see the evolution of evermore ordered life? This question was not seriously tackled scientifically until well into the next century. Vivekananda's vision allows for regions that are winding down and others that are building up which is to say regions that are losing energy and other that are gaining it. He expands his idea by speaking of the universe having been initially projected out and then slowly subsiding like a wave: "All motion,everything in the universe, can be likened to waves undergoing successive rise and fall". [33] Just as a wave gets flatter and flatter as time goes by, we must infer that all the regions of the universe will eventually be in the same state, that is the final 'fine' state at the end of this Kalpa. This must be the case because if it were not, each region would have, in effect, its own Kalpa and this would mean that Vivekananda was suggesting a universe comprised of linked but eternally different sub-universes. This is not suggested by Vivekananda. While Vivekananda did not develop this further, it offered the possibility that Advaita could address philosophically the problems raised by the Second Law.

The Unity of Knowledge

"Science is nothing but the finding of unity. As soon as science would reach perfect unity it would stop from further progress because it would reach its goal".[34] So, one day, science will be complete and there will be no more to discover and when this happens it will be a unified whole. Completion and unity seem to be synonymous here. Vivekananda does not ponder the question as to how we will know when this completion has been reached and Richard Jones makes the point that science cannot know such a thing by its own methods: "Science has no key by the knowing of which everything is known".[35] If it had such a key it would be omniscient and that would mean that anyone possessing such a key would know all that is , that was and is to come and to know it consciously. Such a person would effectively be God or, in Advaitic terms, fully superconscious, but science cannot, as Vivekananda often said, lead to this state because it is beyond reason and so by our own reasoning and by Vivekananda's, science can never know if it is complete, scientists will go on beavering away at problems real or imagined regardless of whether they really exist any longer. The notion that *completion means unity* suggests that unity in science has to do with knowledge -the completion of knowledge entails the unity of knowledge. The idea of the completion of scientific knowledge belonged to so far a horizon in the late nineteenth century, as it does now, that it seems not to have arisen as a matter for serious discussion. However, there was talk of the *unity of knowledge*.

The idea that science and all knowledge moved to some sort of unity was a favourite theme of Herbert Spencer, whom we know Vivekananda read. As the historian Merz said:

"The dictum of Herbert Spencer that science is partially unified knowledge and philosophy completely unified knowledge, is probably one of the least disputed and most generally accepted expressions of that thinker .....Now, if we may say that the present age is marked by a desire to arrive at unity of thought, we are forced at the same time to confess that it is equally marked by the failure to attain or even approach it."[36]

The difficulty in devising a system of the "unification of knowledge and thought" as Spencer put it,[37] was evident in his own effort Finally, he produced a system relating to scientific method rather than to all thought. Spencer could discern a coherence of method in the sciences, but to go beyond that proved too difficult.

Science seeks knowledge but it cannot be defined by knowledge If it could be so defined we could no longer call most of the great scientists of the past 'scientists' The Universal Theory of Gravitation developed by Sir Isaac Newton has been shown to be correct but limited. His unwillingness to support a wave theory of light is judged to have held back the progress of optics in the eighteenth century. The fact is, we do not judge Newton or any other scientist on the basis of total correctness; it is their attitude of mind, their method and some limited success that we look for. The mark of the scientist has been to apply critical observation and thought to the utmost given the resources of the time

We can also say that the progress of science has been marked by the

development of 'unifying positions' or 'platforms of agreement' This has been done by an increasing level of objectivity. Before the Scientific Revolution of the sixteenth and seventeeth centuries the reality of the cosmos was taken to be that all heavenly bodies orbit the earth because that is exactly what we seem to see them do The theory of Universal Gravitation allows us to understand that only the Moon orbits the Earth while we and all the other planets orbit the Sun and we could see this if we moved out of the solar system. However, this theory also accounts for why they all appear to orbit the Earth Universal Gravitation allows us to see what we see but it also gives us a platform on which we can stand in agreement with any other observer in the Universe. To that extent, it unifies our position with all other observers in the Universe. The same is true of Dalton's atomic theory, Maxwell's electromagnetic theory and, in biology, of Darwin's theory of Natural Selection [38] However, all these theories are widely different from each other, touching on such different realms of experience and any theory encompassing them all, is as distant now as it was in the late nineteenth century

Science does demand unity in a structural sense Where two areas of knowledge touch, they should flow one to the other without jarring. The ideas of atomic structure, for example, should allow for the building of molecules as we believe them to be. Contiguous areas should be seamless and if the ideas of one flatly contradict those of another, then one set of ideas has to be modified or abandoned. The driving force of much work rests in the attempt to

resolve conflicts and to this extent science is driven towards unity and away from conflict. However, this is less a positive pull towards unity than it is a negative push from conflict. The so-called unity of science is better seen as a *harmony* of parts and structure.

While the unity of science resides in 'platforms of agreement', non-conflict and contiguity of relationships, the unity of Advaita is that of substance. For science a magnet is different from an electrically charged stick despite the fact that both can be described by the same set of equations; for Advaita the difference is superficial; it may exist but it is not Real. In Advaita, all force, all matter, are but Prana, Akasha - Mahat - variously manifest. Advaitic knowledge is the apprehension of this substantial sameness of all, this non-duality. Advaita is not interested in discovering relationships between electricity and magnetism, or between mind and matter. It already knows what it needs to know - that there is no relationship because there are no relata; they are one substance. We must then conclude that the 'unity' sought by science and that of Advaita are, at this point in history and in the nineteenth century, significantly different. However, Vivekananda's idea that there could be *unifying substance* was not, as we shall now see, at odds with the science of the day.

CHAPTER 5

THE NATURE OF MATTER

The Ether

Writing on Sankhya Philosophy, Vivekananda gave the clearest insight we have into his thoughts on atoms and matter. Sankhya Philosophy speaks of atoms but: "according to Sankhya, atoms are not the primal state The universe does not come out of atoms: they may be the secondary or tertiary state".[1] Vivekananda supported this view because it is in accord, he believed , with modern scientific study:

"..as far as modern investigations go , they rather poirit to the same conclusion For instance, in the modern theory of ether, if you say ether is atomic, it will not solve anything. To make it clearer, say that air is composed of atoms, and we know that ether is everywhere, interplanetary, omnipresent, and that air atom are floating, as it were in ether. If ether again be composed of atoms, there will be spaces between every two atoms of ether. What fills up these? If you suppose there is another ether still finer which does this, there will again be other spaces between atoms of that finer ether which require filling up, and so it will be *regressus ad infinitum*, which the Sankhya philosophers call the " cause leading to nothing". So the atomic theory cannot be final".[2]

Vivekananda takes the theory of an all pervading ether to be a scientific staple While Vivekananda did not mention it here, the idea of ether is found in Indian cosmology in the Laws of Manu:

"Mind, impelled by (Brahman's) desire to create, performs the work of creation by modifying itself, thence ether is produced; they declare that sound is the quality of the latter.
But from ether, modifying itself , springs the pure, powerful wind, the vehicle of

all perfumes; that is held to possess the quality of touch "[3]

This ancient ether is not just matter but also inherently mind and it is the stuff out of which all matter and sensation will be produced. The ether, then, was not just a modern scientific idea which underscores Advaitic philosophy, it was also an idea of ancient Indian pedigree.

The ether had been a powerfully necessary presumption for physical science throughout the century. In the 1790's Thomas Young had begun a study into the physical nature of light and published his findings in 1801 in Principle of Interference showing that light behaves as a wave not as a stream of particles as had be hitherto generally believed. But a wave can only be a wave in some medium (there cannot be a water wave if there is no water), and so Young postulated that light is a wave in a "luminiferous ether pervades all the universe,rare and elastic in a high degree". [4] Further work by Young and especially Augustin Fresnel established the wave theory of light and underlined the urgent need to understand the "luminiferous ether". The importance of this became more acute after the 1860's with the publication of James Clerk Maxwell's work showing that electromagnetic waves travel just as light does and so must go through the ether.[5] In 1881 and 1887 Michelson and Morley performed experiments which would have detected the motion of the earth relative to the ether had the ether been there, but no ether was detected. Today's text books describe these experiments as the first clanging notes in the death march of the ether, and indeed they were, but at the time the case

was not so obvious. They invalidated only one theory of the ether but there were several others still being developed Merz's history of science published in 1904 is detailed and comprehensive but he makes no mention at all of the Michelson-Morley experiments indicating that their status in the 1890's was problematic By the 1890's, theories of the ether were foundering, but no-one had any inkling of the revolutionary means by which they would meet their demise. This was to be Einstein's theory of Special Relativity in 1905 which would dispel all apparent need for the ether So we can say that Vivekananda's belief that the idea of the ether was a well established scientific norm was unexceptionable given the time in which he wrote.

Atoms

What then of atoms? The above passage is the bulk of what Vivekananda said on the subject but we can take this and his ideas about matter in general to make some inferences. A favourite image in Vivekananda's thinking is of " an unbroken ocean of matter" in which a body is "continuously changing" [6] This applies to the entire universe: "The whole universe, therefore, is as it were , a peculiar form ; the Absolute is the ocean, while you and I, the sun and stars, and everything else are various waves of that ocean".[7]

This idea of an unbroken continuity of matter, not at all discrete, was vital to his belief in the action of mind on matter and in his paper on Raja- Yoga he expands on it:

"Physically this universe is one: there is no difference between the sun and you The scientist will tell you it is only a fiction to say the contrary. There is no real difference between the table and me; the table is one point in the mass of matter, and I another point. Each form represents, as it were, one whirlpool in the infinite ocean of matter, of which not one is constant. Just as in a rushing stream there may be millions of whirlpools, the water in each of which is different every moment, turning round and round for a few seconds, and then passing out, replaced by a fresh quantity, so the whole universe is one constantly changing mass of matter, in which all forms of existence are so many whirlpools. A mass of matter enters into one whirlpool , say a human body, stays there for a period, becomes changed, and goes out into another, say an animal body this time, from which again after a few years, it enters into another whirlpool, called a lump of mineral..... ...Not one is constant, but everything is changing, matter eternally concreting and disintegrating So it is with the mind Matter is represented by the ether; when the action of the Prana is most subtle, this very ether, in the finer state of vibration , will represent the mind, and there it will be still one unbroken mass. If you can simply get to that subtle vibration, you will see and feel that the whole universe is composed of subtle vibrations " [8]

The universe portrayed here is that of continuous, non-discrete matter which apparently aggregates into more or less dense clumps of a certain form. The mechanism by which they aggregate is a hydrodynamic one - a "whirlpool". It seems that the only thing that distinguishes one aggregate from another is shape or form and not content; the sun, a human a table are all the same except for form. This is a core Advaitic idea; we see different forms and give them names But this naming of forms obscures to us the deeper reality of continuous substance, of non-duality. This error, or ignorance , on our part is Maya.

Before examining how this picture would have appealed to science in the 1890's, let us try to infer a little more detail.

Vivekananda has not denied the existence of atoms but they, by the above

arguments, can only be microscopic whirlpools in the ether. It could be that primary atoms aggregate to form larger secondary atoms which are in effect a group of whirlpools now having a size and shape and consequently having properties different from the primary atoms It could be that they aggregate to form the macroscopic bodies of our experience. The mechanism by which the whirlpools were set in motion and come together or disintegrate cannot be inferred in any detail; only a general reference to the action of Prana can be made. These whirlpool/atoms seem to be carried along by the moving ether. This is a hydrodynamic picture of a continuous swirling, fluid, it is not a picture of discrete particles flitting in a vacuum. Twentieth century physics has it that the universe is largely empty space dotted with lumps of matter varying in size from sub-atomic particle to stars and permeated by 'fields' which arise from matter and which in turn affect the motion of matter. [9] This hydrodynamic picture is strange to late twentieth century minds but this was not at all the case in the 1890's. This hydrodynamic picture was very largely the late nineteenth century scientific view of matter.

Nineteenth Century View of Matter

The atomic theory of matter had ancient roots both in the East and in the West. In India it was characteristic of the Nyaya Vaishesika school and in the West it was associated with the names of Heraclitus, Empedocles, Democritus and Lucretius from antiquity. The modern theory had its start with John Dalton

who was able to develop an atomic theory capable of explaining the new observations in chemistry regarding the quantities of various substances which can combine with each other; the law relating to this was the law of fixed and multiple proportions Dalton's atoms were independent and indestructible; different substances had different atoms and an atom of hydrogen was the smallest of all. Dalton's theory was hugely successful in guiding chemists in the vast amount of experimental and analytical work that followed throughout the century, but many who used it successfully did not necessarily believe that atoms actually did exist. This was a case of a scientific theory that was known to work well in practice but was suspected by many of being only a useful model not an actual picture of reality. Wollaston, Davy, Liebig and Faraday, all notable for their chemical researches early in the century, had doubts about the reality of the atoms. As more phenomena were observed, more intricate theories were required; a successful theory of isomerism (particles having the same constituents but different shapes) was developed; Pasteur (1850) recognized that molecules can be left or right handed (chirality), and Kekule devised a theory of three-dimensional, stereo-chemistry. The vast range of chemical knowledge and theory formed, as Merz said, "one of the most complicated machineries ever introduced into science",[10] but there was a gaping hole in it. By the end of the century no one was any the wiser as to why the atoms should come together as they did or why they should then stay together; there was no acceptable theory of what is called 'chemical affinity'.

As a result, many chemists at the end of the century were still circumspect about the reality of atoms - any kind of atoms:

"The atomic view is a hypothesis resting upon the fact that substances combine in fixed and multiple proportions, and upon the further observation that bodies both in the solid and liquid state show different properties in different directions in space. But as to the nature of the differences of the elements the atomic view gives no information, it simply asserts these differences, assumes them as physical constants, and tries to describe them by number and measurement The atomic view is therefore at best only a provisional basis, a convenient resting place, similar to that which Newton found in physical astronomy, and on which has been established the astronomical view of nature" [11]

At its extreme, this reserve regarding atomic theory, held back from allowing that atoms of any kind could be said to exist. This provisionality remained, for some, despite the powerful achievements of the kinetic theory of gases which was one of the triumphs of nineteenth physical science By the 1860's the work of James Prescott Joule, Rudolph Clausius and especially James Clerk Maxwell had shown that the well known macroscopic behaviour of gases in terms of temperature, pressure and volume could be derived theoretically from considering a gas to be a collection of small, perfectly hard particles of the same mass and all in random motion experiencing neither attraction to each other nor repulsion but just hitting each other and the walls of their container now and then. This evidence, along with the observations of chemistry, inclined the majority to believe that atoms of some kind must exist, but the question as to what they were actually like was, as Merz indicated, an enormous puzzle Writing on the Atom in the 1875, ninth edition of the Encyclopedia Britannica, James Clerk Maxwell, the greatest physical scientist of the century, detailed the

current atomic theories and their problems. The 'small hard body' approach, he said, could account for the permanence of solid bodies, but it failed to account for the particular colours (line spectrum) produced when a gas was heated up. These spectra were taken to be the result of elastic vibrations inside the atom, but the theory of perfectly hard (inelastic) bodies could not account for this. The alternative theory was that of the vortex-atom. Building on Helmholtz's study of fluid behaviour and, in particular, the formation and persistence of vortex rings, William Thomson, Lord Kelvin, developed a theory that held that an atom was but a minuscule vortex in the all pervading ether. It was not without problems, said Maxwell, but: "On the other hand, the vortex ring of Helmholtz, imagined as the true form of the atom by Thomson, satisfies more of the conditions than any other atom hitherto imagined."[12] The vortex - atom looked promising because a given atom would have a fixed size, as we know it should; it could vibrate internally and so account for line spectra; different atoms could have different properties, as we know they must have, and the problem of affinity began to look manageable because vortex-atoms would link just as we see smoke rings link. For Maxwell, the great charm of the vortex atom theory was a self-contained elegance quite unlike that of the small hard body theory, so contrived and cobbled together by comparison. However, as Maxwell incisively showed, this vortex- atom could not account for the existence of gravitation or of mass as he felt any atomic theory should ultimately be able to do. Nor could it account for the known temperature

behaviour of matter and it seemed that when applied to the bulk of known matter in the universe, it demanded unconscionable amounts of energy, the origin of which could not be imagined. Having devoted three full pages of his article to this theory alone, Maxwell closes the section. "We have devoted more space to this theory than it seems to deserve, because it is ingenious and because it is the only theory so far developed as to be capable of being attacked and defended."[13] It proved difficult to make further progress with the vortex-atom theory, and it began to fall into disfavour, so that by 1898, Lord Kelvin had virtually abandoned it on the grounds that so little progress had been made or seemed possible.[14]

Educated readers could easily come to know of these theories, at least in outline. The ninth edition of the Encyclopedia Britannica was a prime source of very substantial information and criticism. In this age of improvement, some scientists took pride in writing lucid, non-facile accounts which were widely read. John Tyndall's Heat as a Mode of Motion (1863) and P.G.Tait's Recent Advances of Physical Science (1885) are two examples In Britain, popular lectures abounded and the topic of smoke rings and whirling fluids was often the subject, no doubt, in part, because they afforded the possibility of such engaging demonstrations. The British Association's meetings were widely and quite fully reported in the daily newspapers thus bringing the major scientific names, ideas and disputes of the day before the reading public

We can now see why Vivekananda might have been so confident in expressing

his hydrodynamic/atomic theory of matter. The picture he conjured of whirlpools and atoms, which must be whirlpools in the eternal ether, was exactly the picture presented by the theory of the ether and the vortex-atom. These theories were not the obscure ideas of minor, unknown scientists but of towering names in nineteenth century science. While Vivekananda stretched credibility when he suggested that no scientist would see a fundamental difference between a person and a chair, his essential description of matter was well in agreement with much of nineteenth century thought and it would not have sounded at all odd to an educated audience. The progress of physical science in the first twenty years of the next century was to be such that all talk of vortices and the ether was thoroughly buried but, of course, Vivekananda did not live to see that.

Given Vivekananda's analogical mode of reasoning and his attachment to the principle of Uniformity we can appreciate why this view of matter was so appealing to him. The whirl or vortex had been seen giving structure to astronomical nebulae, to the solar system, the rings of Saturn, the ocean currents and to smoke-rings; surely it would be the means by which all forms emerge. Ether was the single unifying substance and the vortex or whirlpool the unifying structural principle. The great power of the whirlpool/ether view of matter, from Vivekananda's point of view, was that it provided for the unity of all matter and mind. This unity of mind and matter was the basis of any possible action of mind upon mind or of mind upon matter, as Vivekananda was

to describe in his papers on Raja-Yoga. But this non-duality of all matter and mind is not readily observed by humans and this failure of perception, Maya, is what we must next consider.

CHAPTER 6

MAYA

Maya

Fundamental to all Advaita Vedanta is the concept of "vivarta vada" or phenomenal appearance as developed in the theory of Maya. This is commonly thought of as the idea of the phenomenal world as illusion although Vivekananda was careful not to attach himself firmly to this[1]. Vivekananda referred to it most often when speaking of human experience and suffering, but he also addressed some of its metaphysical implications. These are basic to Advaita's relationship with rational thought and science and allow us to further ponder Vivekananda's ideas on the status of scientific theories and to see his ultimate concerns more clearly.

Maya in Vivekananda's Thought

For Vivekananda, Maya was not properly to be regarded as a theory but rather " a simple statement of facts - what we are and what we see around us".[2] His reluctance to call it a theory may have been because he knew it could not ultimately account for Maya, as we shall see he readily admitted, but neither could he abandon an idea which so completely provided comfort in the realm of daily life and, at the same time, sustained the idea of metaphysical unity. It

was, moreover, a particularly Indian idea. Vivekananda acknowledged that Kant, in his Critique of Pure Reason, had , by his analysis of space, time and causation, developed something he believed to be akin to Maya[3] but he found that Maya could fit no non-Indian school of idealism or realism and was quite alien to the Western mind.[4]

Maya is our failure to perceive the absolute non-duality of all being.

"the whole universe is one. There is only one Self, in the universe, only One existence, and that One Existence, when it passes through the forms of time, space and causation, is called by different names .".[5]

In The Vedanta Philosophy he outlined the concept of Maya saying that.

" vivarta vada or apparent manifestation" had been addressed by various Indian schools but, " according to the Advaitists proper, the followers of Shankaracharya, the whole universe is the *apparent* evolution of God God is the material cause of the universe, but not really, only apparently".[6]

Having aligned himself with Shankara, he developed Shankara's classic snake/rope analogy in which a coiled rope looks like a snake and is mistaken for such. Upon further inspection the error is revealed and the observer now sees a rope and not a snake; the snake was an illusion and has disappeared leaving the observer to see what is really there - the rope. This example illustrates the most important component in the Advaitic theory of error; while errors in logic can certainly occur, this illusion- error is an error in perception which precedes all logic. This perceptual error is, for Indian thought, a fundamental, systematic error in all perception; we look about us and see a variety of objects which we take to be separate and discrete We perceive an object and describe it by its size, colour, shape, duration etc and this leads us

to define the object as different from other objects. But this perception of differentiation as being the part of the nature of the object, the noumenon or thing-in-itself, is wrong because: " Even so this whole universe as it exists is that Being (Brahman) . It is unchanged, and all the changes we see in it are only apparent". [7] If we could perceive the universe correctly, the illusion of unreal differentiation would disappear and we would perceive only reality, the non-duality or Brahman. At his point we would want to ask "what is real?" and "how does this error arise?"

What is Real?

"According to Advaita philosophy, there is one thing real in the universe, which it calls Brahman; everything else is unreal, manifested and manufactured out of Brahman by the power of Maya. To reach back to that Brahman is our goal. We are, each one of us, that Brahman, that Reality, plus this Maya. If we can get rid of this Maya or ignorance then we become what we really are."[8]

So Brahman is real but all else in unreal. However, this is not quite as starkly stated in other passages where we see that ' unreal' certainly does not mean 'non-existent' Consider Vivekananda's wave-in-the-ocean illustration of the meaning of Maya.

"Upon it (the one Self) name and form (Maya) have painted all these dreams; it is form that makes the wave from the sea. Suppose the wave subsides, will the form remain? No, it will vanish. The existence of the wave was entirely dependent upon the existence of the sea, but, the existence of the sea was not at all dependent upon the existence of the wave." [9]

We see the universe filled with objects characterized by name and form but these stand in relation to Brahman as a wave stands in relation to the sea. The

wave is temporary and changing and it depends upon the sea for its existence, but it is not non-existent. He was more explicit in another passage. "..yet their form was not a delusion. So long as the wave existed the form was there, and you were bound to see the form. This is Maya" [10]

The position given here is seems classically Advaitic, as Vivekananda claimed, but it has to be added that he expressed a modified view in The Ideal of a Universal Religion. This modified view appears in the context of reference to Darwinian evolution and is evidently influenced by it He said strongly "Unity in variety is the plan of the universe" and "variety is the first principle of life" This must be so because, "Perfect balance would be our destruction" [11] "Differentiation" is "the soul of our progress". [12] Imbalance and variety are what allow all motion, all development and all evolution. The "unity of sameness" would only occur at the cost of a destroyed universe Karl Potter has analyzed Indian philosophy as it relates to difference, non-difference, identity and non-identity and he points out that the Jains realized that if all objects, souls, ideas etc. - or relata - are identical, then there can be no causation and so "nothing new is ever produced".[13] Vivekananda plainly articulates the same difficulty in the above argument and the phrase " unity in variety" sounds just like the Jain conclusion which was to say that "the non-difference of the relata must really be construed as identity- in- difference" [14]. It is difficult to see how one could avoid this conclusion if one insists upon both identity and difference as having somewhat equal ontological value, as Vivekananda appears to have done if

we consider the above discussion. However, Advaitins did not give them equal ontological value - far from it - difference was illusory and unreal while only identity is real. The view of identity-in-difference was not taken by Advaitins, they insisted upon on identity and no difference.[15] His consideration of the theory of evolution had brought him to an understanding of the importance of difference and the tensions that arise from it, and it illustrates how Vivekananda's idea of Maya was, as he admitted, not fully worked out Despite his pondering of the need for difference in evolution, and his seemingly clear statement of identity -in-difference, he did not abandon the primacy of unity , or non-duality So, returning to the ocean waves, we see that for him the important thing about them is not their waveness (difference) but their ocean-ness (non-difference) They exist but what we perceive is not real because we do not perceive them as Brahman which alone is real If we consider the wave as the model for existent non-reality we see that it is temporal and changing; it is dependent and distinguished by form. Brahman, the existent real, is eternal , independent, changeless and formless. This raises the question as to whether there are levels of reality. A mountain endures longer than a wave; is the mountain more real. Gases are formless; are they more real than solids? Is it possible to gradually improve perception to see the more enduring and formless elements of an object rather than the structured transient ones?

The possibility of levels of reality is important when thinking of the relationship

of Advaita to science. Science would not claim to have ultimate descriptions, the state of atomic theory at the end of the last century testified to that. But it would claim that it some how knew more about, let us say, the nature and behaviour of matter, than it had known at the beginning of the century Progress surely meant knowing more of how things really might be For example , while the nature of atoms was unknown - they could be particles or vortices all in a continuous ether - it did seem certain that matter, at a microscopic level, was not continuously uniform and was differentiated in form if not in substance. We need, then, to consider what might be meant by 'more real'.

If science does proceed to reveal the 'more real', as opposed to the ultimately real, its value to Advaita would be clear We recall that only Brahman is real and everything else is unreal; this seems to allow no gradation - either we perceive reality or we do not. However, when we consider what Vivekananda has said about the progress of science and his belief that it supports Advaita, it surely cannot be that its progress towards unity is fundamentally unreal because then it would not be relevant

Vivekananda was impressed that science had shown the same process of evolution for all creatures, had shown the cyclicity of all processes, had show the uniformity of processes, and had shown the conservation of energy and the continuity of matter. All these led science *towards* Unity but not right to it Advaita's metaphysical path was different and superior; it led both *towards* and

to Unity. So it seems that science moves towards the 'Real' , but since the Real is indivisible, science is always in the realm of the unreal. How can that which is never real lead toward the Real? This might possibly be understood by an illustration such as the following The Real and the Unreal are utterly separate; the truth is not divisible and there can be no gradations in Reality Reality and Unreality may be likened to two lands separated by a chasm; on the one side soaring high up is Reality and on the other, lower down, is Unreality. A person in the land of Reality can see everything there is to see in Unreality but a person in Unreality can only see that there is a precipice which marks the boundary of his own land. It is said that it is possible to bridge, leap or ford the precipice and get into this other land and so there must surely be some positions in the land of Unreality from which this is more possible than others. It may be that they give a better view or take one to a better fording pointing. In this sense, those positions, while still in Unreality, hold out the possibility of escape more readily than others and can be regarded as being less unreal than others. It seems that science is a way of bringing one to better vantage point and at the same time developing skills which may themselves be important in making the final leap to Reality. As we shall see in the discussion on Raja Yoga, the skill of concentration is the skill par excellence needed to bridge this chasm, and it is one which Vivekananda judged to be the special preserve of science and Raja Yoga. Science, as we know Vivekananda staunchly maintained, predisposes the mind to Unity and thus presumably

positions it to perceive more readily the real Advaitic unity of Brahman. What science can do then, is enhance the possibility of getting to Reality but it cannot actually make the leap.

Karl Potter has spoken of "leap philosophies" and "progress philosophies" as characteristic of Indian philosophy He says that " the basic problem of systematic philosophy" in India has long been agreed upon: "That problem , in a nutshell, is to discover a conceptual scheme or map in which we can find a route to complete freedom from wherever we are now".[16] Those who believe this freedom can be obtained "progressively by action, devotion, or understanding" are the "progress philosophers" but those who believe this freedom can only be attained by " a sudden leap of insight" are the 'leap philosophers".[17] When analyzing Advaitin philosophers he found that it was not always possible to put them in one group or another Suresvara (ninth century) and Prakasanada could be described as leap philosophers and Vacaspati Misra (tenth century) could be said to be a progress philosopher, but many others, including Shankaracharya, balanced between the two It looks as though this is the case with Vivekananda Quite apart from his ideas on Karma and Bhakti Yogas, we can see that he holds the phenomenal world to be unreal (but existent) and that science can never fully unmask this unreality, but science can orientate us and position us to perceive Reality more readily than any other process can. The 'unmasking', however, can only be finally achieved by the non-rational insight or realization. Despite its lumbering in a constant fog of

ignorance, science is a progress towards reality but the final realization is reached by a non-rational leap.

How Does Maya Arise?

If we are indeed an evolved form of Brahman, one with all, why do we not just know this. How does this "Ignorance or Maya" [18] arise and can more be said?

"These changes (differences) are caused by Desha, Kala and Nimitta (space , time and causation) or, according to a higher psychological generalisation, by Nama and Rupa (name and form) It is by name and form that one thing is differentiated from another. The name and form alone cause the difference. In reality they are one and the same...it is not... that there is something as phenomenon and something noumenon." [19]

Indians normally used the terms "name" and "form", but following Kant, Vivekananda here speaks of space, time and causation; these are Maya. He argued that they are not real because there cannot be two or more realities; Reality is indivisible:

"Yet we see that there is a proposition that the Absolute is manifesting itself as many, through the veil of space, time and causation. Therefore, it seems that here are two, the Absolute and Maya...It seems apparently very convincing that these are two To this the Advaitist replies that it cannot be two."[20]

Anything that is ultimate and real must be independent, as we saw in the wave/ ocean analysis. However, space, time and causation are dependent upon each other; "time depends on two events, just space has to be related to outside objects."[21] Moreover, there is a psychological factor; our perception of time and of space are variable depending upon our experience and state of mind. Thus, there is no doubt for him that they are both mutually dependent and

psychologically dependent and so cannot possibly be real. So Maya or ignorance arises because we do not perceive the nature of space, time and causation, thinking they are somehow ultimate and absolute when they are not.

This was the extent of his analysis of the unreality of space, time and causation. While twentieth century science may have some empathy with this direction of thought, nineteenth century science did not and so we must look at it more closely. Does the mutual dependence of space/time /causation necessarily mean that they, as group, that is Maya, cannot be independent? While Vivekananda did not pursue this we can see how such a discussion might have gone if we think back to Prana and Akasha. This example will illustrate what we already know - that Advaita's ontology tends to conflate all categories into one, Brahman, although its epistemology names categories More importantly though, the example indicates why this conflation is necessary to Advaita. Prana and Akasha are essentially energy, force and matter, phenomenally different but not independent , Prana acts upon Akasha and needs it for its expression, and Akasha could not evolve without Prana. Together Prana and Akasha are both expressions of Mahat, they are not dual. Mahat could be an ultimate independent category, capable of acting upon other categories or of being acted upon. However, Mahat, Universal Mind, is not ultimate because there must in addition be soul or Purusha Again, Purusha could be independent but Advaita cannot allow this. In Advaita, Purusha and

Mahat are both expressions of Brahman; they are not different although we may think of them differently. The thrust in Advaita is always to one and only one ultimate. As we saw in Vivekananda's discussion of evolution, duality or multiplicity of elements necessarily means tension between the elements - a battle. Humans are matter, mind and soul, apparently inseparable until death. If soul is locked to mind and matter, but not the same as them, then, it must be in tension with them and this leaves open the possibility that it might not always be able to free itself from them. This is a possibility that Indian thought would not countenance, as Potter has so strongly argued as we have already seen.[22] The only way to remove the unconscionable possibility that soul could be unassailably confined by matter is to say that it is not different from it in reality but only in appearance. Advaita maintains the possibility of human freedom by never even allowing the possibility that one category could overpower another since they are all identical and one. The possibility that space/time/causation (Maya), which has interdependent elements, might as a group be independent, and thereby Real, cannot, therefore, arise. Like the wave in the sea, space, time and causation are not real because they are not ultimate but they do exist: "They have no real existence; yet they are not non-existent,seeing that through them all things are manifesting as this universe".[23]

It seems that Maya is of Brahman, but we then face the question as to why Brahman should throw his veil over itself , Vivekananda readily admitted this to be a knotty problem: "The question - what is the cause of Maya (illusion) - has

been asked for at least three thousand years; and the only answer is : when the world is able to formulate a logical question, we shall answer it." [24] Quite simply, Vivekananda could not offer any clue as to the purpose of Maya and had to leave it at that.[25] This ignorance as regards its origins and purpose did not undermine his belief in it because the human world seemed to offer so much evidence for it.

Maya and Freedom

Life is full of surprises and disappointments, said Vivekananda. It seems inherently contradictory; we see a mother assiduously care for her child and yet we know, as does she, that the child will only grow old and die. We see the Christian West prosper but so much at the expense of the non-Christian East.[26] All this tangled confusion, which traps and frustrates us, is Maya It seems we are utterly bound and yet despite this human beings cannot believe there is no way out of it: "Humans cannot believe that they cannot be free. But nature is ruled by law".[27] We have an "inner voice" which tells us we can be free despite rule-bound nature: "That freedom was your own nature, and this Maya never bound you. Nature never has power over you",[28] and "No law in this universe can bind him (a person), for this universe is his He is the whole universe".[29] Expressed again is what Karl Potter has described as a fundamental, perhaps the most fundamental, presupposition of Indian philosophy, namely, that freedom of the individual is possible. To clarify the

meaning of this freedom, Potter has spoken of "freedom to" and "freedom from". [30] The latter is the freedom from all constraints, particularly those imposed by nature, and he points out that Western philosophers have doubted the possibility that humans ever could be totally free of the constraints of natural laws. Potter adds that , in general, Western philosophers have been more at ease with "freedom to" that is the freedom " to predict and control future events",[31] and they have seen this second freedom as being largely separate from the first. This, he says, is in contrast with Indian philosophy , which has never allowed that one could operate without the other. It is plain from the above, that Vivekananda does not accept the bonds of nature as being unbreakable constraints upon the person. The study of Vivekananda's presentation of Raja Yoga will show how this Yoga is supposed to effect this freedom from natural constraint to such an extraordinary degree that the Yogin is then free to do anything and to know everything.

To sustain a belief in "freedom from" it must be possible to transcend or overcome the bonds of nature. There seem to be only two ways this can happen. A person could, as it were, break them or overcome them in some way. Alternatively, if the bonds are not real the person only has to realize this to be free of them. Advaita does not choose the first route. This route implies tension between two different entities, the person and nature, and as we have seen, this means that nature could be the victor. This being so, Advaita cannot allow the ontological duality of person and nature and so conflates the

categories. This leaves the illusory nature of the bonds which is the choice of Advaita. As soon as we realize that the bonds are not 'other' but are us, our being, they cannot be in conflict with us and so their bond-like nature must evaporate. This does not mean that the substrate noumenon, which we experience as the phenomenon of the bond, disappears, but that the bondness disappears just as the illusory snake disappeared but the rope remained.

Nature, with its apparent bonds, is sensed and thought about through space , time and causation - the veil of Maya.[32] All science and reason is, then, in the realm of Maya. However, far from dismissing science, Vivekananda embraced it and, as I argued earlier, this seems to be because its level of unreality is not so great as that of common or irrational thought There could be no doubt that scientific and technological advance had increased human "freedom from " and 'freedom to" in the nineteenth century. Steam power alone had vastly increased the mobility of people, freeing them from fixed and often tyrannical homelands and allowing them to choose new ones to an extent never possible before. It allowed for greater mobility of goods thus freeing many from hunger and want by opening new markets and new ways of living The list of new freedoms attached to the progress of the century was endless, but as Vivekananda understood, it was not all onward and upward. Miserable materialism, squalid cities, mindless conditions of work, growing inequality were all fed by the very progress which brought so much of the freedom in other

respects. Worst of all, in his view, was the decline in what had never been a splendid spiritual sensibility in the West It is as though science can provide a picture, almost a photograph of reality which is a true likeness as far as it goes but it cannot provide a three or four dimensional view or deliver all the sounds and smells which are integral to the reality. Just as a picture can reveal much of what is true, the incompleteness of it may lead to the formation of wrong assumptions and mistakes which would otherwise not have arisen. In freeing us from old errors it may invoke new ones from which we must get untangled. Perhaps then, it is not surprising that Vivekananda did not set the power of science equal to that of Advaitic philosophy. As Merz and others so readily observed, science did not seem to be headed towards any kind of closure but appeared to increasingly fabricating new and diverse worlds

If we argue, as Vivekananda did, that science is only ever partial, and if we believe that this alone opens a door to erroneous speculation, then it would seem that science must be endless. He did not conclude this and held that one day all science would be complete and unified, but limited It seems that whether we say science is endless or limited, it can only ever be an assistant on the journey to the Ultimate Reality. For all that Vivekananda was to associate science with Raja Yoga, it seems that science , seen from the Indian scheme of things, must be part of Jnana Yoga - the way of knowledge. Vivekananda's Advaita recognized all four of the Hindu Yogas as paths to Reality but of them he said most about Raja Yoga. This was not only the most

traditional one for most Advaitins, it was also one which aimed to directly penetrate the veil of Maya. Vivekananda claimed that the means by which this could be done were largely, but not totally, scientific.

CHAPTER 7

RAJA YOGA AS SCIENCE

Vivekananda and Raja Yoga

Speaking at the Parliament of Religions, Vivekananda had considered the problem of how people seem to have their own inborn character traits. This, he argued could only be explained by the reincarnation of the soul and this , he felt, accords with science because · "Science wants to explain everything by habit, and habit is got through repetitions. So repetitions are necessary to explain the natural habits of the newborn soul."[1] Anticipating the obvious objection as to why no one remembers past lives, he suggested this was due to our limited consciousness However, that this limit is apparent and not real is easily illustrated; at the moment he was speaking and thinking in English but at any moment he could revert to his mother tongue. "that shows that consciousness is only a surface of the mental ocean, and within its depths are stored our experiences "[2] Past lives can be remembered if the right techniques are used These techniques are taught by " the science of Raja Yoga" [3] While Vivekananda lectured extensively on all the Yogas - Karma, Jnana, and Bhakti - it is Raja Yoga which claims our attention here since it raises questions about physical and psychological experience, as distinct from spiritual and moral experience, and it is in these we might expect science to have a natural

interest. It is the practical expression of Advaita Vedanta

Two essential elements underlie the practice of Raja Yoga They are the existence of what Vivekananda called the "superconscious state" [4] and the continuous, substantial unity of all the universe - the Advaitic Reality

Writing in The Powers of the Mind, he repeated the Advaitic position : "there are no such realities as a physical world, a mental world, a spiritual world Whatever is, is one." [5] Mind is, of course, ' finer' than matter and so , in the Vedantic scheme, it is more real and powerful. Anyone who can control mind has the key to great power, since, all mind being one, one can control the mind in others too: "He who knows and controls his own mind knows the secret of every mind and has power over every mind "[6] It must be said immediately that the aim of Raja Yoga was to bring a person to control of his or her own mind and most emphatically not to control the minds of others although this possibility was not doubted. Vivekananda was adamant about this stricture He vilified the well established practice of hypnotism as "reprehensible" and leading to the " ultimate ruin" of the hypnotized subject, who, far from gaining control of his or her own mind, is surrendering the mind to the control of another. The subject's mind will eventually become a "shapeless, powerless mass" fit only for a "lunatic asylum". [7]

Physical Basis - Unity of Matter

The power which allows the control of all mind resides in the superconscious

mind which alone is capable of perceiving supersensuous objects which, Vivekananda says, are the thoughts of others and the unity of the universe. It is this finest and highest level of mind which can act directly on matter to produce healing and extraordinary feats such as levitation and walking on water. The idea of mind control and of mind acting on matter would not have been novel to his late nineteenth century audience. Hypnotism had flourished from the time of Anton Mesmer[8] and Spiritualism had proved to be a beguiling movement from the middle of the century. From the mid - 1870's both Christian Scientists and Theosophists thrived, and their appeal rested on the extraordinary abilities of the mind. Vivekananda was well aware of all these movements and sects [9] but he felt that neither they nor the orthodox religions had anything to compete with Raja Yoga which, for him, was a supervening science capable of enclosing and correcting all of them. As he argued that the ideas of Spiritualism could easily be explained by this system, we find the physical basis for Raja Yoga explained.

We will recall that Prana is that which manifests itself as force or energy in the the whole universe. The control of Prana is Pranayama and this is the business of both physical science and Raja Yoga, but:

" That part of Pranayama which attempts to control physical manifestations of the Prana by physical means is called physical science, and that which tries to control the manifestations of the Prana as mental force by mental means is called Raja Yoga "[10]

We will note here that Vivekananda equates science with control which would surely be contentious, for, much as science may lead to the possibility of

control of the physical world, the initial impulse , for many scientists, is not control but understanding. The apparent discrepancy is accounted for if we understand that 'control' in Raja Yoga is discipline and and not the exercise of power over the external world. Physical science and Raja Yoga are set here as two sides of a scientific coin, they are not the same but they are parallel His basis for this continuity and parallelism is the all pervading ether

"Think of the universe as an ocean of ether, consisting of layer after layer of varying degrees of vibration under the action of Prana away from the centre the vibrations are less, nearer to it they become quicker and quicker, one order of vibration makes one plane "[11]

Low planes of vibration correspond to matter and low consciousness, and they cannot detect the higher planes The higher planes can increasingly perceive the lower ones and control them. At the highest level are the superconscious planes. It was easy to see, said Vivekananda, how there could be a plane for imperfect disembodied spirits, or mind, such as the Spiritualists dealt with. It seemed that these mind/spirits could communicate with people but only through certain mediums. Their action was limited and they were patently not always very knowledgable or wise [12] By contrast, Raja Yoga's reach far exceeded that of the Spiritualists, it aimed for the superconscious planes collectively known as "Samadhi"[13] wherein both wisdom and power resided It is only possible for the superconscious mind to act on both mind and matter because both mind and matter are one - they are both merely different states of the ether or Akasha. The existence of the ether or Akasha seems essential to the theory of Raja Yoga and , as we have seen earlier, this was a scientific

paradigm at this time. Vivekananda had good reason to suppose that in this his system was in accord with science. He, of course was stretching the idea of the ether beyond that of science when he claimed that mind was also a form of it. However, if one believed, as many did, that atoms were but ether vortices and that atoms make gross matter and that in gross matter mind develops, we can see that his claim may not be as much of a stretch as it first appears. The plausible invocation of the ether as the ground for Raja Yoga clothed the theory in scientific language and added to its credibility. However, this physical underpinning of Raja Yoga to a physical, substantial ether made it vulnerable. If the physical basis is real, it must be testable at some point in time although the skills to to do this may not exist at present. In addition, the theory will be undermined if the physical theory , in this case of the ether, falls. As it happened, the 1890's were the dying years of the ether theory, although almost no scientists, let alone Vivekananda, could know that. The attempts to detect it had proved fruitless and the arrival of Einstein's Theory of Special Relativity in 1905 showed the ether to be excess to requirements; it was abandoned. This would not have utterly discredited the effects claimed by Raja Yoga; if they occur, they have to be explained but the metaphysical framework worked out by Vivekananda would be called into doubt.

Raja Yoga: an Indian Science

Much as he wanted to show that this Yoga and Advaita Vedanta were in

harmony with Western Science, Vivekananda also allowed no doubt as to their peculiarly Indian heritage. Thousands of years ago, Indians noticed "wonderful things" which we today would call psychic phenomena.[14] It may have been, he thought, that the Indians were more inclined to notice them than other people were because of the sparsity of population. At any rate, Hindus (not merely Indians) set about studying these and "made a science of it". [15] Despite the fact that Indians had shown great creativity in mathematics and physical science up to then, their overwhelming interest now became the study of these phenomena to the extent that the Yogis carried out all kinds of "experiments" on, for example, the effect of "charms", "magic" and such things as colour, food and odour affinities, and people floating in air to name but some. [16] The exact nature of this experimentation is not recorded by Vivekananda, and we do not know what it was However, Vivekananda believed that it had been done in an orderly and systematic fashion.

Experimental scientific method in the West, dating from the time of Galileo and Newton, had been incresingly refined; a phenomenon was observed and then observed for changes as one possibly relevant factor at a time was varied. In this way the relationship between the phenomenon and other variables could be established , sometimes with mathematical exactitude. This method was used not only in what was clearly pure science but also in engineering bringing about incremental and essential improvements in the new industries of the century such as steam power and locomotion, the chemical industry and the

new electrical industry.[17] Without some detail as to how the Yogi's experiments were conducted, it is difficult to say whether they could be regarded as having been arrived at scientifically in the sense just described. The absence of such records demands that if the Yoga was to be called scientific, new tests would have to be done. For now, one point remains; this superior science of Raja Yoga, which is available to all regardless of race or creed, is Indian .

The Steps of Raja-Yoga

Raja Yoga has eight steps :

"Yama - non-killing, truthfulness, non-stealing, continence, and non-receiving of any gifts. Next is Niyama - cleanliness, contentment, austerity, study, and self-surrender to God. Then comes Asana, or posture; Pranayama, or control of Prana; Pratyahara, or restraint of the senses from their objects; Dharana, or or fixing the mind on a spot; Dhyana, or meditation; and Samadhi, or superconsciousness." [18]

These steps are not necessarily followed strictly one after the other. All can, and in a sense must, be pursued at the same time but the later ones can deliver no success unless the early ones form a firm ground. Where Yama and Niyama are elements with a social dimension, the rest relate to particular and detailed physical and mental control. A correct physical posture, Asana, which can be sustained for long periods of meditation, is not an aesthetic requirement but a practical one. A poor posture would block the "nerve currents" to the extent that the person could not perform the other steps effectively.[19] Vivekananda elaborated upon the benefit of posture and the

related Hatha-Yoga. Health benefits such as reduction of sickness and longevity could be expected. Not only that, practised to the proper degree they permitted the conscious control of the involuntary muscles which is well beyond what people can normally do. The use of the mind to keep the body healthy is, says Vivekananda, "usually called Christian Science", [20] which is good but limited. Raja Yoga aims for more: "We must not forget that health is only a means to an end. If health were the end, we would be like animals, animals rarely becomes unhealthy."[21] Just as Raja Yoga can enclose the ideas of Spiritualism, it does the same with Christian Science. However, the main point here is that while Vivekananda extols the health benefits of the practice, they are held to be essentially incidental to it. They are not of primary interest to him and yet they are just the kind of effects that scientists would be interested in and would want to investigate. The effect of mind over matter in healing and in the conscious control of the autonomic system would seem to provide evidence of the continuity of mind and matter and of the Advaitic non-duality of all mind and matter. Despite his enthusiasm for these benefits, Vivekananda did not seem to consider their value in any critique that might arise of Raja Yoga or of Advaita. They are not presented as evidence pointing to the system's validity. No suggestion is made that doubters of the philosophy could subject these claims to test and thereby partially test the philosophy This is symptomatic of his presentation both of Advaita and of Raja Yoga. His presentation is always of the form of descriptive pronouncement, the

plausibility of which is underwritten by reference to science through analogy; we have seen earlier a broad use of analogy between Advaitic insights and the ideas of science. This gives a reasonable cast but tends to mask the lack of criticality The ideal form of critical presentation in philosophical work is surely the dialogue by which objections are systematically raised and then answered . However, he was on a mission of preaching Advaita, of putting it on the map of Western religious life. It was primarily an oral mission to a generally educated but mixed range of people, and such a mission, intended to promote a particular religious philosophy, would probably not have been enhanced by critical presentation Given this , the lack of criticality is not evidence of any deficiency in Vivekananda's thought or presentation. However, it lays the presentation, and hence the philosophy, open to scepticism in its scientific claims

The fourth step is Pranayama or the control of Prana " the infinite, omnipresent manifesting power in this universe"[22]; it is "everything that we call energy, everything that we call force", and, most especially it is " the vital force of every being".[23] Yogic Pranayama starts by gaining control of the force closest to us, namely, breathing and the " motion of the lungs".[24] Breathing and breath is the " engine " of the body, and it must be controlled by the practise of certain breathing rhythms and chants. For Vivekananda, breathing is a derived force resulting from the movement of the muscles which in turn are controlled by the nerves and these the are under the control of the mind or "thought force".[25]

Having controlled breathing by mental control, the opened and strengthened mind can now attempt to control other forces such as gravity , electricity and magnetism. Vivekananda was not retiring about the possibilities arising from this:

"This opens the door to almost unlimited power. Suppose, for instance, a man understood Prana perfectly, and could control, what power on earth would not be his? He would be able to move the sun and stars out of their places, to control the universe from the atoms to the biggest suns, because he would control Prana."[26]

This Pranayama was sought by many " Faith healers, Spiritualists, Christian Scientists, Hypnotists etc."[27] but again, he himself, apart from noting the huge possibilities does not dwell upon them.

Vitalism

Before looking at the remaining Yoga steps, we must consider another point which arises here. Vivekananda used the term *vital force* although not often. This term would have alerted scientists in the late nineteenth century to closer attention because it was so closely linked with the biological philosophy of 'vitalism'. Vitalism was the idea that a special force - a 'life force ' - infused matter to give it life, and death was the departure of this force This view prevailed in the understanding of life in the early nineteenth century.

In the course of the century the work of Theodor Schwann and Matthias Schleiden, Justus Liebig, and Rudolph Virchow had shown that all living things were composed of cells, the common bricks of all living tissue, and that these

cells could be analyzed chemically just as could non-living and inorganic things.[28] Studies on animals, such as those by Emil Du Bois Raymond on Researches on Animal Electricity (1848) and by Heinrich von Helmholtz, Physiological Optics (1848) and Physiological Acoustics (1862), [29] indicated that living things could be understood in terms of the known physical forces. A reductionist, mechanistic view of life arose. Darwin's theory of Evolution by Natural Selection was dispassionately mechanistic. The old vitalism could not survive, but perhaps a neo-vitalism was possible. Virchow spoke of an, "Old and New Vitalism" pointing out that living and dead creatures contain all the same substances but are plainly different. Fully accepting that life must act under the normal physical forces he also argued that these alone were not sufficient to account for life and that there must be a "derived force", that is derived from the physical forces, which he would call a "vital force" and this would be life.[30]

However, by the end of the century biology had largely abandoned speculation as to why life starts and why it stops; it concentrated on those questions which had brought it such spectacular success, namely on the how of life processes and not the why. Vitalism was no longer a respectable position as was pithily expressed by T.H. Huxley in 1887:

"There may be Rip Van Winkles about, who still hold by vital force; but among those biologists who have not been asleep for the last quarter of a century, 'vital force' no longer figures in the vocabulary of science. It is a patent survival of realism; the generalisation from experience that all living bodies exhibit certain activities of a definite character is made the basis of the notion that every living body contains an entity " vital force" which is assumed to be the cause of

these activities."[31]

So what of Vivekananda's 'vital force'?

We find " Prana is the vital force of every being"[32] and , "Every part of the body can be filled with Prana, this vital force ..... ".[33] So it is Prana, the fundamental unmanifested force or energy, which is the vital force. When Prana infuses matter it lives but there is no question that Vivekananda doubts that a living thing is subject to the normal physical forces that we know about Is Vivekananda's idea, then, like Virchow's ? Is Prana-as-vital-force derived from the physical forces but also larger than the sum of those forces?

Vivekananda does have a evolutionary view of matter and Prana Matter has evolved under the action of Prana, manifest in different ways such as gravity, electricity and magnetism While he does not discuss this explicitly, it seems reasonable to assume that the forces themselves have evolved from an undifferentiated primal state. It would, then, be possible to put Prana- as- vital-force as the highest development of this process being a force that could only emerge in certain conditions of matter brought about by the 'lower' physical forces in the first place. In that case we would have a neo-vitalism. This would be quite different from traditional vitalism which is essentially dualistic, the vital force being infused by some exterior, higher agency and being drawn back to it upon death. In this case, the vital force would emerge mechanistically as a result of certain physical preconditions.

However, Vivekananda believed in reincarnation in which case the soul survives

the demise the matter it inhabited The soul or vital force survives the body when its physical state changes due to physical forces acting [34] Bearing this in mind, it seems that Prana -as- vital- force can only be manifest in certain conditions of matter and that its action is attenuated by them However, it .s *not* derived from those conditions of matter. *nor* is it an evolution of them even though it is a higher and more powerful force It is enabled by those conditions In this case, Prana-as-vital-force is like physical forces Consider, for example, a magnetic field which can exist but , for a while, affects no matter, so far as we can tell However, if some iron is introduced, the iron will immediately move differently from other matter due to the presence of the field The field is manifest; we see its action When the iron is removed, the field remains but, again, we do not detect it The field is not manifest Magnetism is selective; it only becomes manifest when iron or a very few other materials are present Gravity, on the other hand, is far less selective All large masses (we ignore atomic particles here) are affected by gravity Prana-as-vital-force is manifest only when it encounters organic matter and then in different degrees In lower creatures it is only partially manifest and in the highest Yogis it is the most manifest This scheme is vitalistic and apparently not so different from the dualistic vitalism of the West However, all forces, be they physical or mental, are but manifestations of Prana - the generalised energy or force For Advaita, there are no *categorically* different forces , only the manifestations, and apparent manifestations are different At, bottom, vital

force is not different from gravity or magnetism .While nineteenth century science had developed the principle of the Conservation of Energy, and hence the interchangeability of energy. it did not recognize the equality or sameness of all energy, still less force As mentioned earlier, heat was seen to be the lowest form of energy and the least convertible, there were different grades of energy The Advaitic reduction of all force to Prana destroyed differences that science would have been far more cautious about Left with no categorical differences, only the manifest differences remain gravity , magnetism and so on are but different manifestations; they are defined as manifests In which case, vital force is a manifest and can be viewed like the physical forces, it is another force We have an effective dualism and an effective vitalism Vivekananda did not discuss the process of reincarnation, so we can only speculate

For Advaita Vedanta, it cannot be that a soul hops around from body to body as one dies and another is conceived for souls are not separate but continuous and one, any idea of separation in time or space is Maya and illusion It seems to be that a particular vital force - Prana - develops in a person in particular way, and when that body dies, the vital force or soul remains as a set of ' vibrations' in the continuum of Prana. When it encounters suitable matter again, it can become manifest again and develop further. This means that Vivekananda's vitalism, while effectively dualistic, is not the dualistic type of the early nineteenth century nor is it a mechanistic neo-vitalism of derived force. It

is only mechanistic in the sense that certain conditions of matter must exist for it to appear. Because the force that can exist outside matter (we may call it vital force or soul), and it is what makes matter live when it inheres in it, I must doubt that Huxley would have been appeased It seems that Vivekananda's idea of vital force would have been at odds with the biological wisdom of the day.

Controlling the Mind

Returning to the process of Raja Yoga, we come to the fifth step Pratyahara which is the controlling of the mind so that it is not continually distracted by the senses. The "maddened Monkey" [35] of the mind has a great and natural difficulty in concentrating without being deflected from the object of its concentration by the input of the senses Whereas Pratyahara may be described as a negative control - keeping the mind from dealing with certain perceptions - the next step, Dharana, is a neutral or still control, forcing the mind to fix on certain objects or even sensations to the exclusion of all else In Dharana the mind 'holds' the object, be it an external physical one or a mental one, in the seventh step, Dhyana, the mind 'flows' out to it in an active meditation This active meditation becomes more refined until the mind meditates "only on the internal part" of the object. When it does this it is in the superconscious state, this is Samadhi [36] In this state, "there is no feeling of "I", and yet the mind works"; a person "goes into it a fool, he comes out a sage" [37]

All the great religious leaders of the past have experienced this, and, from it, their wisdom has come even though they may have often accredited it to angels or other agencies The journey to this point is not necessarily an easy or short one, but for Vivekananda it this which is the goal, and it is the only experience of real interest It is the experience not only of great insight but also of happiness and peace, for, having lost all sense of "I", all fear and desire must go too and these are the roots of all misery.[38]

This ultimate goal has been reached scientifically:

"All the different steps in Yoga are intended to bring us scientifically to the superconscious state or Samadhi Furthermore, this is a most vital point to understand, that inspiration is as much in every man's nature as it was in that of the ancient prophets" [39]

More than that, he later adds that this path is open to animal and angels [40]

Abundantly open to all regardless of pedigree, creed or literacy; it is truly universal [41]

Organization of Raja Yoga

Raja Yoga is 'scientific'; the steps are "scientifically organized"[42] so that we reach Samadhi in a "scientific manner" [43]. So insistent is this claim of Vivekananda as to the organization of Raja Yoga, we must ponder it further Vivekananda constantly repeated the need for concentration , maybe over a lifetime, for success in Raja Yoga It is not an adjunct to life but a life's work; it must be the, "one idea of your life - think of it , dream of it, live on it," [44] for "the power of concentration is the only key to the treasure house of

knowledge "[45] This concentration, he says, is something which puts Raja Yoga parallel to physical science such as chemistry or astronomy

"There is only one method by which to attain this knowledge, that which is called concentration The chemist in his laboratory concentrates all the energies of his mind into one focus, and throws them upon the materials he is analyzing .. .The astronomer concentrates all the energies of his mind and projects them through his telescope upon the skies," [46]

How is this concentration peculiarly scientific in itself? Certainly practitioners of other avocations seem to demonstrate plentiful concentration - the musician, dancer, craftsman or athlete, all of these demand not only varying amounts of mental concentration but also physical concentration In common with them, Raja Yoga needs both physical and mental concentration making demands on posture , breathing, even diet in addition to the mental focus By contrast, the pursuit of science demands no special physical conditioning or stricture, science generally requires mainly mental concentration To this extent, Raja Yoga is far more like a craft than a science. However, Vivekananda has restricted his rhetorical space to include only Advaita, Yoga and Science - only they can be up for discussion This being so, we must feel that plausible though the comparison may seem at first sight, this plausibility derives from rhetorical strength only and not from fuller observation and reason

To examine the claim that Raja Yoga is 'scientifically organized' we need to consider what it is to be 'scientifically organized' and to see how Raja Yoga itself is organized

The initial steps in Yama and then Niyama touch upon the direct relationship

with others and then move to social as well as personally desirable traits such as cleanliness, contentment, austerity and so on; these are all behaviours and attitudes which will be noticed by others and affect social relations. It seems that good social interactions must precede personal development Then comes control of the body and then of the mind from which great knowledge and thence power can develop The system as a whole seems to spiral in from the person as a social being to the person as a mental manifestation, from the differentiated individual who is is defined by his place in society to the individual seen in terms of the essence of being This essence is the mind, and it is not differentiated from one person to another but is continuous from one to another We may find a parallel to this is in, say , chemistry Consider the study of iron First it must be located in rock in ore, this could be seen as its gross context It must then be smelted out of the ore and refined into the pure metal This finer substance can now be formed into many different shapes and can perform many functions, it is , in a sense, more powerful, certainly more useful than in its unrefined state To study it further though, the chemist would subject it to many tests in the hope of learning what the atoms of this metal might be like and the physicist might go further and note that its atoms are composed of even smaller particles which can be found in all atoms even those of other elements This study has gone from iron in its gross, environmental state to its most minute constituents which are common to all atoms. To this extent, Raja Yoga parallels scientific discovery It does attempt to proceed in an orderly way

along a path chosen to lead to deeper knowledge of the essence of being However, this is so broad an analogy that it invites the question as to whether there are other 'systems' which are not usually regarded scientific but which are none the less orderly and effective

We do not have to look far Vivekananda, himself, devoted some time to explaining that Raja Yoga is an educational path which develops the personality rather than the intellect alone [47] The aim of all education, he said, should be to make a person grow in every way possible, and Yoga was the means for this, par excellence. He linked this to a theory of human development suggesting that from infancy to adulthood, a person "runs through the stages through which his race has come up"[48], but the whole of humanity is itself evolving and one day that evolution will end with humans "perfect", which is to say fully superconscious. For most people this perfection is only reached after many rebirths but the high practitioners of this Yoga can achieve it in one life time as have all the great prophets [49]

If we consider a traditional training structure which takes the neophyte and turns him or her into an adept, we see a pattern similar to Raja Yoga Consider a painter, dancer or craftsman The highest practitioners have usually spent years in a studio or school, a social institution in which the ethos of their craft was strong and from which they would learn not only the technical skills but also the social skills necessary to its execution They would progress from the physical mastery of the craft, which naturally involves a certain physical control

of themselves, to mental mastery and ultimately, in those able enough, to creativity - which is a certain kind of power Such systems have been highly effective and structured They can only be effective if some understanding of human nature and the craft involved is inherent in them They have been developed by trial, error and common sense and adapted as time has revealed new insights but we would hardly call them scientific. There remains the possibility that other methods may develop which are equally effective Furthermore, we do not readily call a system devised by people for people 'scientific' unless it has a large natural component and is then, supposedly , subject to natural laws, medicine would be such a case Raja Yoga, of course claims this component, but that has yet to be established. We may compare one method, say, for teaching music, with another and do it scientifically, showing which produced better results here and which did better there but that would still not incline us to say that the training method was, in itself, scientific If we are reluctant to call such well established methods, for musicians, artists, craftsmen and so on 'scientific' with their numerous visible successes, it seems that at least equal caution should be applied when we consider Raja Yoga Certainly , we can say it is a training or educational structure, but being far less ubiquitous, we can not have the confidence in its results that we might have for other training structures

Unlike the training of a dancer or of a painter, the system of Raja Yoga claims to have insight into the nature of human beings and of the universe and bases

itself upon this insight Advaita Vedanta and Raja Yoga are not just scientific or educational systems alone, but are religious and philosophical in nature, Vivekananda was always clear that Advaita is larger than science The experience of non-duality and the exercise of the superconscious is possible because that is how the universe is Raja Yoga is held to be scientific because it is organized according to that truth

The test of Raja Yoga as a science, therefore, must be in its reality claims and in its interpretation of them, particularly those which might be particular to it

Reality Claims Psychical Phenomena

What are the reality claims of interest here? Firstly, there are those which can be witnessed by more than one person at a time; walking on water would be an example of this Secondly there are those which are entirely internal such as the experience of non-duality in Samadhi. Let us consider Vivekananda's views on the first type

We have already seen that the witnessable phenomena, were, according to Vivekananda, were the instigating factors in the history of Raja Yoga, and that they were responsible for the shift of Indian scientific development away from the physical sciences They were as important to Indian science, it seems, as the observations of the Greeks, Copernicus. Tycho Brahe and Galileo were to the rise of Western Science. Given this large historical importance, the tenor of Vivekananda's writings on these occurrences is muted, and he devotes little

space to them The most extended account occurs in his translation of Patanjali's Yoga Aphorisms and is not accompanied by a commentary [50] When questioned about such things, he was cautious but unabashed A report in The Memphis Commercial of 1898 says that when asked about miracles he promptly said, " We do not believe in miracles at all but that apparently strange things may be accomplished under the operation of natural laws" [51] He went on to say that thought reading, prophesy and levitation were all possible but that he himself had never seen levitation He seemed not be impressed by such things, at one time speaking of "little things like spirit-rapping or table rapping which are mere childs' play",[52] but later adding that these things (telepathy and clairvoyance) are "the very stepping stones to real psychological investigation" Vivekananda had no doubt about the occurrence of what were called psychical phenomena, and they had been keenly important in his own religious growth,[53] but he did not dwell on them when presenting his philosophy He recognized their importance to the scientific study of the mind but suggested no program as to how this could be done However, he urged scientists to take up the study and had no patience with those who dismissed psychic claims out of hand:

"Material scientists have no right to say that things like this are not possible ; they can only say, "We do not know " Science has to collect facts, generalize upon them, deduce principles, and state the truth - that is all But if we begin by denying the facts, how can science be?" [54]

These remarks were made in response to a lecture given by someone else and it is not clear what range of psychic phenomena were touched upon except that

clairvoyance was included Vivekananda spoke to the question of the proof of such phenomena, and the thrust of his answer was that strict proof is very difficult because scientific proof is always more complex and subtle than one might imagine. He considers a simple physical or chemical demonstration and points out that it is only meaningful to those who are sufficiently educated or trained, that is, to someone who knows what kind of changes are significant and which are not A "scientific demonstration", he says, is, "that certain facts should be adduced as proving certain more intricate facts" [55] This, he knows, is no easy task and:

> "So all I have to say is that in order to have scientific explanation of psychical phenomena, we require not only perfect evidence on the side of the phenomena themselves, but a good deal of training on the part of those who want to see "

This passage affords some interesting points. It is clear that his idea of scientific explanation and investigation is not as simplistic as his words may at other times suggest He knows that mere observation or experience is not scientific. The experience or observation must be a critical one In calling for proper studies he cannot be suggesting that he himself needs such proof, nor do the devotees of Raja Yoga who presumably, in the course of their practice, will be furnished with direct but educated experience of such phenomena Rather , he is calling for scientists to do this for the sake of science

Such studies had been undertaken by some interested scientists although Vivekananda makes no reference to them despite the fact that they surely

should have been of interest to him. The advent of Spiritualism Christian Science and Theosophy had made the public well aware of claims made as to psychic phenomena - the action of mind over matter. These movements set great store by such manifestations because they believed that they provided direct evidence of the power of the spirit Like Vivekananda, these heterodox movements held that true religion did not come from books or dogmas but that it could and should be experienced just as the prophets had experienced it. Also, like Vivekananda they insisted that their insistence upon such experience made them scientific and, like him, they denied that the phenomena - table - rapping, trance states, healings and many others - were supernatural. [56] They were held to be fully natural and within the laws of nature but as yet unexplained by science Their claims were closely scrutinised from all quarters and Spiritualism suffered serious setbacks with the discovery of much fraud in the 1870's Leading Spiritualists tried to be vigilant about the possibility of fraud Despite the lack of scientific reputability, a few scientists did make serious studies Most notable among these was Sir William Crookes, a major British scientist of the time Crookes became President for the Society for Psychological Research in 1897, but this did not prevent him from being elected to the highest of all scientific offices, President of the Royal Society from 1913 to 1915 He was , " an experimentalist of consummate skill" , experimental prowess being the dominant feature of his career, in which, among many things, he produced a vacuum to one millionth of an atmosphere thus enabling

the discovery of X-Rays and work leading to the discovery of the electron [57] He found no fraud in his study of the medium Daniel Douglas Home [58] Alfred R Wallace, the co-discoverer of the theory of Natural Selection, also became involved in the study of mediumship and again found no duplicity [59] The Dialectical Society in London instigated a study in 1869, involving some forty investigators drawn from all the professions In 1875 the British Psychological Society was started, and it became incorporated in 1895 stating that it existed "for the purpose of making an organised and systematic attempt to investigate various sorts of debateable phenomena which are *prima facie* inexplicable on any generally recognized hypothesis "[60] In the early years of this century it attracted the efforts of the eminent physicist Sir Oliver Lodge The most famous devotee of the spirit world was doctor turned author, Sir Arthur Conan Doyle, creator of the doyen of all scientific and sceptical detectives, Sherlock Holmes. It is clear from all of this that interest in psychical phenomena was enduring and serious in this period

All the scientists involved in this work had to endure much ridicule by attaching their names to such studies but they were not daunted It was frequently the interpretation of the phenomena rather than their existence which was called into question, for the possibility of telepathic communication was often well accepted but many doubted that it was mediated by disembodied spirits.[61]

T.H. Huxley was no Spiritualist, it was he who coined the term "agnostic" and

he was agnostic He was utterly unimpressed by the claims made for psychic phenomena but he insisted that such phenomena could occur because, he argued, they could not be categorically proved to be impossible While considering Gospel stories and miracle claims, he quoted David Hume: "Whatever is intelligible and can be distinctly conceived and implies no contradictions, can never be proved false by any demonstrative argument or abstract reasoning *a priori*" [62] That one can could conceive of demons, for example, was obvious, said Huxley, since their existence does not seem to contradict other known fact This being so, they may exist However, this does not mean Huxley believed in demons; on the contrary he found the arguments for them "ridiculously" insufficient [63] He considered the story of turning of the water into wine, it would not be impossible, he argued, if it turns out that chemical elements are not, as was then thought, immutable. Insects walk on water and this allows us to conceive, as per Hume, the possibility that humans may also do this although we have no idea how Some creatures routinely reproduce by "virgin procreation" so perhaps this too can happen with humans; some become so desiccated in dry conditions that they are to all intents and purposes dead, but they revivify when hydrated, so perhaps "restoration of life after death" is possible for humans too. Huxley regarded all these things as hugely "improbable" but emphatically not "impossible". In a clear statement of scientific open-mindedness he said:

"it is sufficiently obvious, not only that we are at the beginning of our knowledge of nature, instead of having arrived at the end of it, but that the limitations of

our faculties are such that we never can be in a position to set the possibilities of nature. We have knowledge of what is happening and of what a has happened; of what will happen we have and can have no more than expectation, grounded on our more or less correct reading of past experience and prompted by the faith, begotten of that experience, that the order of nature in the future will resemble its order in the past."[64]

This most sceptical of scientists refused to close the doors on the possibility of miraculous events

This digression into the late nineteenth century considerations of paranormal events shows us that the claims and expectations of Raja Yoga in these matters were not completely contrary to the science or sensibility of the day These claims would not have been dismissed out of hand by everyone who called himself or herself a scientist although many would have ridiculed them The witnessable events should be testable and some scientists had attempted to do this. We could say that the fact that Raja Yoga makes claims which are testable, even if they do not stand up under test, allows it some claim to be called scientific. However, it its not enough just to leave it at that The doing of science is the testing of claims, ideas, hypotheses While Vivekananda had called for scientists to conduct such studies he makes no reference to the work already done. The lack of any call on existing evidence and the lack of repeated calls for controlled investigation undermines his position Much as he claimed Raja Yoga to be scientific, his own lack of criticality is non-scientific

Reality Claims: Samadhi

The second category of phenomena are those which cannot be directly

witnessed and of these Samadhi is the most important

"The highest grade of Samadhi is when we see the real thing, when we see the material out of which the whole of these grades of beings is composed, and that one lump of clay being known, we know all the clay in the universe."[65]

This stage is beyond reason, knowledge gained in is not of reason. Such questions as to whether the soul is immortal or whether there is a God are to be answered here to the certitude of the person experiencing it but their certitude can never be translated into reasoned argument because such things are beyond argument.[66] This is the "beyond" from which all the major religious teachers have claimed as the source of their insights. However, it is not a "beyond", it is a 'within' because this knowledge has always been there within the person, but the superconscious state must be achieved before this knowledge can be revealed.

Samadhi is possible and essential for all because , " that is religion Experience is the only teacher we have."[67] Samadhi is the direct, unmediated experience of non-duality, being beyond logic it is beyond explanation and even description Raja Yoga leads to this experience of truth, and science insists, he says, that only experience, not books or dogmas, can show the truth. Raja Yoga is scientific because, like science, it insists on experience. We can agree that science does demand experience, but what kind of experience? A brief consideration shows that it does not have to be direct experience; few people have 'experienced' volcanoes or tidal waves and yet no one seems to doubt their existence. So long as credible reports exist which fit a reasonable

structure of explanation, we are likely to believe the reports We cannot possibly ever see a proton, a virus or a bacterium with our own , unaided eye and yet we believe they exist We can experience them through many forms of mediation - the microscope or electron microscope, for bacteria and the virus, a whole structure of indirect experience and logic for the proton As we saw earlier, Vivekananda himself spoke of the necessity of educated experience and education is another kind of mediation Science does not demand *unmediated experience* of a thing-in-itself (noumenon) or of an event-in-itself but it does demand that this thing or event fits into a coherent framework from which its properties might be inferred and by which the framework itself is illuminated and extended. Science demands that a person attesting to the existence of a thing or event does have the *mediated experience* of the thing or object That is, the person must experience for himself or herself the logic and the interpretation of it In our everyday lives, we may be content to say that a common cold is caused by a virus but this is not a scientific statement It can only be a scientific statement if the person saying it has experienced the whole interpretive structure supporting it, but, he or she does not have to have seen a virus sitting on the desk. There is no doubt that direct , unmediated experience is powerful, it provides the raw data upon which our picture, scientific or otherwise, of the world is constructed However, simple, pure observation has not been without its pitfalls as the history of science has shown. The observation that the sun rises in the East and sets in the West has

been experienced and stated repeatedly for as long as people have been able to look at it, for human beings it is the lived truth. The reinterpration of this most obvious experience in the sixteenth and seventeenth centuries was the most defining act of the scientific revolution. It may be an experienced truth if you live on earth, but it would not be so if you moved to another planet or out of the solar system altogether Experience may indeed be a great teacher, but from the sixteenth and seventeenth centuries onward, scientists never ceased to question it. It is the questioning of the experience that is important to science, not the directness of the experience From the seventeenth century came what has become known as scientific method ; any theory or statement should be testable and its observations should be repeatable The testability and repeatability of theories are the hallmarks of science. Is Samadhi testable or repeatable?

Samadhi is an experience that cannot be witnessed by others directly. The same might be said of pain or joy If we find that the descriptions of it from many individuals have much in common, then we are inclined to believe it exists If the individuals are changed in common ways by it then our conviction is strengthened We attach this kind of belief to pain or joy. According to all Hindu teaching, the experience of Samadhi cannot be communicated although many have tried The wisdom gained from it cannot be argued, merely delivered The same thing might be said of what people learn from pain, grief or love. It seems to be that in all these cases, including Samadhi, the most

important wisdom gained has to do with an impress of attitude to life which is so powerful that once experienced forever remains in the entire person There is sufficiently abundant literature in all cultures for us accept the reality of the Samadhi experience just as we do not doubt the experience of pain and joy [68] We must conclude then, that Samadhi is a repeatable experience The existence of so many various reports allows some comparative testing and the fact that its chances of arising are apparently enhanced by the practice of Raja Yoga allows for the possibility of further possible tests It seems possible, therefore, that the reality of the experience can be tested if with some difficulty We cannot reasonably deny the reality of the Samadhi experience but this is not to say we must then accept that it is an experience of reality It is a real experience but does it experience what is real?

Samadhi is undoubtedly a psychological experience - it is the mind which experiences it Vivekananda claims that although this is so, it is an experience of a reality that is both internal and external, the experience of the oneness of all things. This makes it different from, say, pain or joy which are also psychological experiences Pain is a mental response to a physical condition in the body, the condition is (usually) real and so is the response. In pain or grief we might say the world is empty and bitter, and there is surely always a sense in which this true, but it is not a scientific truth Joy may be a response to a totally external event involving other people far away In this state we might feel the whole world is wonderful and infused with kindness, and again,

this may be true, but it is not a scientific truth In both cases, we have events and responses which are quite separate. In both cases certain external events can evoke an internal response Sometimes, these internal states of mind can even occur without the external stimulus; some individuals are permanently cheerful, others depressed and do not attach the state to any particular external condition So far as Samadhi is concerned, we see no obviously external stimulus and the search for such a stimulus would not be at Vivekananda's behest for, in his philosophy, Samadhi is beyond science. In this system, Samadhi cannot be, as with pain or joy, a purely internally generated state with no necessary connection to the world beyond It is not, in this philosophy , generated at all, rather it is ' arrived at' since the non-duality of all is eternal Viewed from Advaita, Samadhi is certainly not purely psychological . Science, however, would need more data to support his view. If the individual feels utterly at one with all, then it must be that everything is one with everything else While this may be so, the simple experience of it does not make it so We have seen the same dilemma of the Sun rising in the East - it looks that way to us but that is not what we would see if we lived outside the solar system.

The knowledge gained in Samadhi is highly subjective - one might say 'hyper-subjective', relying only on an experience which cannot be shared with others nor witnessed by them Since the seventeenth century, science has increasingly moved from subjectivism to high objectivism It has spoken

about 'observation' rather than 'experience' and insisted that the 'observation' become objectified. The observation/object must be visible to all who care to look at it and it must be such that they can very largely agree on what they are seeing, no mattter what their standpoint It is not enough to have a theory which accurately accounts for how we on earth see the sun move; our theory must now accurately account for how we would see it if we moved beyond the solar system The Samadhi way of knowing and the scientific way of knowing are polar opposites. Vivekananda knew this but he did not see this as a conflict but rather a continuity, Samadhi and science cannot be , ultimately, in conflict although they may appear to be at a given time in history They cannot be in conflict because they are different parts in a continuum of knowing and, as with all else in Advaita, of a piece

Conclusion

For all that Vivekananda repeated the scientific nature of Raja Yoga, he also claimed that Raja Yoga, moving to the realm of Samadhi as it does, supersedes science and thus becomes non-scientific For all that he believed that science and Advaita could not conflict, it seems that a vitalistic philosophy of life is implied which would have been at odds with the biological thinking of the late nineteenth century. Vivekananda has insisted that Raja Yoga is scientifically organized We have found that this is too strong a claim, it is logically organized but until the underlying physical claims can be verified, we

can only say that it has the coherence attaching to a training system rather than a scientific one. Raja Yoga makes unusual physical claims relating to the action of mind over matter; these are testable, verifiable claims. The validation of these claims would enhance the status of the Yoga and Advaita, but Vivekananda did not address this matter.

CHAPTER 8

CONCLUSION

At the World Parliament of Religions in Chicago, Swami Vivekananda had emerged as a distinct, clarion and creative voice for Hinduism. He charmed and impressed so many in his audience there, just as he was to do for the rest of his public life, despite a readiness to speak strange, ideas. The notion that idolatry was acceptable was abhorrent to many, especially protestant Christians. Most notable in this regard was his explanation and acceptance of Hindu idolatry - an anathema to Christians and to educated Indians. But this defence of idolatry evidenced certain predispositions in the Swami's thought which we have seen recur throughout this thesis. It is clear that his mode of thought was syncretic and synthetic, invariably seeking out the continuity and connections between events rather than seeking difference or conflict. His conviction that Advaita Vedanta was the philosophical ground for this synthesis was unwavering. These predispositions allowed him to be a powerful apostle of Hinduism weaving beguiling and persuasive Advaitic pictures, but they also worked against close analysis or critical study of those pictures. The Brahmos call for a "new dispensation" in Hinduism was inherently critical of traditional and popular Hinduism, but Vivekananda, we saw, admitted no such need. For him Hinduism had always possessed all the truth that any religion could aspire

to and in the form of Advaita Vedanta, it was the only "scientific religion".

Enthraled by the notion that Advaita was scientific, Vivekananda used the discoveries, ideas and language of science to promote his philosophy. The attraction and power of this scientific connection becomes clear from this passage written in mid-century by the historian Macaulay, in his History of England, where he tells us that scientific progress had:

"lengthened life . mitigated pain extinguished diseases increased fertility of the soil . given new securities to the mariner. . furnished new arms to the warrior spanned great rivers and estuaries with bridges of form unknown to our forefathers... lightened up the night with the splendour of the day... extended human vision.. multiplied the power of human muscles... accelerated motion, annihilated distance... facilitated intercourse, correspondence, all friendly offices, all dispatch of business; and enabled man to descend the depths of the sea, to soar into the air "[1]

To be scientific was to be in every way, it seemed, progressive - to be of the future Christian Scientists and Spiritualists believed that they had a religion, or spirituality, that was scientific, and many liberal Christians believed that Christianity need not be and could not be in perpetual conflict with scientific knowledge On the other hand, there was an influential view, exemplified and fuelled by some histories of science and culture[2], which held that Christianity was the natural enemy of scientific progress The Swami himself said that science had been a "bomb" to Christian theology,[3] but, by contrast, Advaita Vedanta was not at all fazed by new discoveries and ideas, but was itself a very "science of experience".[4] His unflagging effort to synthesize a structure for science and Advaita served to present Advaita as a modern religion for thinking

people; to be the only religion capable of grasping the future rather than constantly carping and crawling querulously along as it could be said Christianity had done. In never failing to speak for the ancient Indian roots of Advaita, the Swami was giving his Western followers a depth and mystery that the newer attempts at scientific religion could not hope to have and , at the same time, he was telling Indians that they had a philosophy the equal to the staggeringly powerful scientific rationalism developed in the West

Swami Vivekananda's attempt to convince listeners of the scientific nature of Advaitic philosophy was exciting and insightful, but his tendency to see only likenesses and analogies left many problems unaddressed Perceiving only harmonies and not dissonance meant that his claims were not moderated by exceptions that others might readily see, and this led his claims to be excessive. We saw that he claimed the steps of Raja Yoga to be "scientifically organized" but we could not agree that this was clearly the case It seems that they are no more logically ordered than the levels of any good training system which we would not necessarily call scientific. The steps are based upon the belief that mind and matter are continuous but this continuity was not and is not established to the degree which Vivekananda claimed it to be Our study of Raja Yoga also taught that Advaitic experience and scientific experience are not the same thing. Advaitic experience is direct, unmediated and incommunicable. Scientific experience, on the other hand, is mediated

experience, that is experience achieved by the use of instruments, of experiments and above all, by an interpretive structure Fundamental to the scientific method is the insistence that all assertions must be tested and repeated which means that they must be communicable. Thus the bald claim that Advaita demands experience and is therefore scientific is highly excessive.

The testability of ideas and discoveries is a cornerstone of scientific method and this rests upon their communicability Certainly, scientific knowledge results from the work of individuals but it is none the less cumulative, growing organically with present workers in dynamic tension with each other and those of the past. Essential though individuals obviously are, science as a whole is a social and changing product; what is known today was not known yesterday In contrast, Advaitic knowledge, or realization , is immutable The possibility of this realization may be enhanced by certain socially transmitted practices, as in Raja Yoga, but it is not dependent upon them. In insisting that science and Advaita were parallel because they both eschewed the authority of books, Vivekananda overlooked the social and historical nature of science Science may have its revolutions but it simply cannot progress without some tradition and in this it is very different from Advaita.

The overuse of analogy became particularly evident in Vivekananda's use of the 'Law of Uniformity' together with the Law of the Conservation of Energy. He argued that because we see cyclicity in so much of nature, particularly in living

things, it must surely be that the Universe itself follows a similar cycle moving from fine to gross and back to fine. We found that this argument founders because the Advaitic universe is the sum of everything and so can never take in or give out energy although it may redistribute it, it conserves energy Things in the universe can and do take in energy from other parts of the universe and then transform and dissipate it in some way, they do not, in themselves, conserve energy Things in the universe can never be like the universe if the universe is Advaitic He went on to argue that science and Advaita shared the same theory of causality and that meant that science supported the Advaitic idea that there was no Creator God However, it seemed that Vivekananda's assertion that "the explanation of things (are) in their own nature" [5] went beyond what science would claim since science does recognize the importance of external events and forces on the behaviour of individual objects.

A central pillar of the Swami's arguments that science and Advaita were parallel, complementary processes was the idea that they both sought Unity However, we found that science seeks harmony and non-conflict rather than strict unity Science does not demand not an endless repetition of the same patterns and substance as it moves from atoms to stars, from molecules to people. Advaita, on the other hand, wanted a universe of continuity and sameness in both pattern and substance; a continuity of structure was not enough. The vortex theory of atoms and the theory of the ether were

ascendant in the last quarter of the nineteenth century and lent some support to this Advaitic view Given this, it is not surprising that Vivekananda was encouraged that science and Advaita had much in common. Unfortunately, in the few years following his death, the theories of vortex atoms and of the ether were washed away and this underscores the treacherous difficulty any religious philosopher must face in leaning heavily on scientific ideas

The Advaitic concept of Unity, or more correctly, non-duality, conflated all categories, space, time, quality, cause, effect, mind and matter are all the same The great difficulty with this, from the point of view of the scientist, is that it removes both the need for and the possibility of explanation Things cannot be described because the very act of description is one of separation of subject and object Things cannot be explained because the effect is no different from the cause But science is the dogged attempt to do these very things This extreme reductionism of Advaita renders all argument circular, at best, and meaningless at worst Advaitic reasoning must find, as Vivekananda unfailingly did, likeness and analogy everywhere In the nineteenth century, much of science itself was bent upon a kind of reductionism - mechanistic reduction Life could no longer be attributed to a vital force but had to explained in terms of chemicals and molecules The behaviour of bulk matter could be explained by the action of its tiniest atomic parts. This reductionist drive could not be denied but at the same time new specialities were growing - geology, biology, chemistry, engineering, psychology. However much

practitioners may have believed that ultimately the phenomena of interest to them were explicable at a microscopic level, that level was rarely of practical interest. The new specialities developed their own concerns and language, their own ideas and hierarchies which were not in conflict with others but were different. We saw that Darwin had been fascinated by the thought that all living things had come from one primordial organism, but this was not his main focus, he was much more fascinated by the mechanism by which things became different. Where Advaita was only interested in the ground of non-difference, scientific interest was much broader Scientists recognized an underlying unity of matter but they were far more interested it its diversity of forms and hierarchies of behaviour and, in this, they differed notably from Advaita.

In his mission to bring Hinduism to the West and to show it to be a religion for the future, Vivekananda stretched scientific ideas well beyond what scientists themselves would have done His correlation of Advaita with science was a powerful preaching tool promoting Advaita as the religion of the future and boosting the respectability of Hinduism enormously in what was a generally less than admiring West His heartfelt belief that Advaita was a scientific religion allowed him to ride the wave of admiration for scientific materialism and rationalism that was so much the spirit of this century However his syncretic, non-critical approach did not serve to provide a convincing presentation of this putative harmony and many problems remained, but,

despite all this, his position on the relationship of religion and science remains impressive His incomplete synthesis was, like so much speculation, thought provoking and daring, for him it was not enough that religious philosophy should not contradict scientific knowledge, it should be ready to search and see its own reflection in it. There could be no doubt that science was the lesser partner in the journey to final truth, as experienced in the realization of non-duality Science alone could never hope to complete this journey, but that science enhanced the chances of completing the journey seems to be clearly implied in his position and thus science becomes effectively part of jnana yoga Vivekananda was able to hold to an ancient but decidedly living great faith and still promote this view with positive vigour. There was never anything defensive in his attempt to show that one of the world's ancient faiths could embrace secular reason This contrasts with the proponents of scientific religion in the West, Christian Scientists and Spiritualists mainly, who were significant but were also breakaways from their main traditions. For them, the tradition would have to be seriously modified to be scientific For much of the twentieth century, Christian theology and science have seemed to have had a gentleman's agreement to stay away from each others territory and given the fast pace of scientific change this may have been a prudent stance.[6] However, the intuition that scientific knowledge and religious or metaphysical knowledge must somehow be connected seems to be a hardy one for the last years of this century have seen a spate of books such as The Tao of Physics (1975) by

Fritjof Kapra, the works of Paul Davies, God and the New Physics (1984), The Mind of God (1992), Leon Lederman's The God Particle (1993) to name but some. Swami Vivekananda, as a Hindu missionary, was quite different from these scientists of no particular religious affiliation. Their efforts at understanding the relations between the life of the spirit and that of the mind and body may be just as flawed as his were, but the re-emergence of this drive to develop an "integrated world-view",[7] as Barbour has called it, imperfect though it may inevitably be, allows us to see that Swami Vivekananda's philosophy not only has a place in Hindu history but also a significant place in the history of this, as yet, un-named movement. While the quality of his ideas may remain open to question, it is the spirit of his thought that finds a resonance even at the close of this twentieth century.

NOTES

Chapter 1

[1] Sailendra Nath Dhar, A Comprehensive Biography of Swami Vivekananda (2 Volumes), (Madras, Vivekananda Prakashan Kendra, 1975) Narendranath Datta was born on January 12 1863 and died 4 July 1902 He later adopted the name Vivishananda and then took the name Vivekananda just before his departure for America in 1893.

[2] Dhar II, Biography 1488, 1493

[3] Dhar 1 Biography
We know many details of his education. He gained his B.A from the General Assemblies College in 1884 His college career was not distinguished despite the fact that many teachers and students were impressed by his brilliance The College President, W W Hastie considered him to be a "genius" with a great future This view was repeated throughout his career by many discriminating people Dhar refers to is "unorthodox" mode of study which seems to have depended upon speed reading and a prodigious memory.(p 50 ff) His courses were in English Sanskrit, Western and Indian History, Logic, Math, Psychology. Philosophy but he read very widely outside the curriculum and this necessitated cramming for his examinations in which his performance was good but not outstanding He later attended the Metropolitan Institute to study law. There is no evidence of any formal scientific education Despite this, he was said to be very scientifically knowledgeable He taught science to the monks at the Math and taught "Physics, Chemistry and Astronomy" to the Maharaja of Khetri where they had access to a microscope and a telescope (p.313) He had access to what was said to be an impressive library at Porandar (p327) When he was in Detroit , he impressed listeners when he responded to a question by giving a long list of English introductory books on Chemistry and Astronomy Near the end of his life, in 1901, he is said to have read the recently arrived new set of the latest Encyclopedia Britannica (9th edition, 1875). When asked random questions on it, he could recite answers perfectly This Britannica was a fine repository of the scientific knowledge of the day having many stellar contributors Had he studied it earlier in his life, as he may well have done, it would have provided a most sound ground of knowledge

[4] Swami Vivekananda, The Complete Works of Swami Vivekananda 12th edition (8 vols). (Advaita Ashrama, Calcutta, 1965) VIII: 373. 374

Chapter 2

[1] CW III: 226,290.
He insisted that he did not go to India for the purpose of attending the Parliament but for the purpose of finding some way to help India's poor Later, he added to this saying he went to preach his ideas which he had been developing for a long time.
In Volume V p.20. He says that Dr. Wright, the professor of classics at Harvard, urged him to attend after he had arrived in the U S A , and that Dr.Wright arranged everything for him. This seems to conflict somewhat with the view of biographers. Dhar in the biography refers to several instances which seem to indicate that Vivekananda did know of the Parliament and intend to go to it before he set sail

[2] John Henry Barrows, ed , The World Parliament of Religions (2 vols) (Chicago, The Parliament Pub Co , 1893) 62

[3] Barrows, Parliament I: 63

[4] Niranjan Dhar, Vedanta and the Bengal Renaissance (Calcutta, Minerva Associates, 1977)142

[5] CW VIII: 116
The Hindus of Jaffna thanked him "for making the western world acquainted with the truths of Hinduism and thereby bringing the West in closer touch with the East" at the Parliament of Religions This sentiment was expressed many times by different Hindu groups

[6] CW III. 290

[7] Barrows, Parliament I: 101

[8] CW III. 477

[9] CW V: 20
Vivekananda referred to Mozoomdar as an "old friend"

[10] Barrows, Parliament I· 86

[11] Barrows, Parliament I· 1174

[12] Barrows, Parliament I. 86

[13] Barrows, Parliament I: 345

[14] Barrows,Parliament II. 1083

[15] Barrows,Parliament I: 347

[16] Barrows,Parliament II: 1226

[17] Barrows, Parliament 1 102

[18] Barrows,Parliament II: 976

[19] Spencer Lavan, "The Brahmo Samaj: India's First Modern Movement For Religious Reform", Religion in Modern India ed. Robert .D. Baird (New Delhi, Manohar, 1981) 1-26
The Brahmo- Samaj was founded by Rammohun Roy who was highly influenced by Western education and Christianity, especially Unitarianism Lavan says that the main drive was to find a "religious identity which could speak to the needs of a more educated, intellectual, *brahmin* - born elite...." (p 6).

[20] Barrows,Parliament II: 969

[21] Barrows,Parliament II. 980

[22] Carus attributed this idea to the medieval schoolmen. T.H Huxley also took the same line as Carus
"the alternative of surrender and suicide is exemplified by Avicenna and his followers when they declared that that which is true in theology may be false in philosophy, and *vice versa* " (Pseudo-Scientific Religion, 1887)

[23] Ian G. Barbour , Issues in Science and Religion (New Jersey, Prentice - Hall, 1966) 1

[24] Barrows,Parliament II: 1585
Sir John William Dawson wrote several books dealing with science in relation to religion He was also the Principal of McGill College, Montreal.

[25] Tess Cosslett, ed., Science and Religion in the Nineteenth Century (Cambridge, Cambridge Univ. Press, 1984) 1 - 24
J W.Draper's "History of the Intellectual Development of Europe" propounded a "warfare" model of religion/science history and was influential.

Chapter 3

[1] CW I 104

[2] CW I 13

[3] CW I: 7

[4] CW I: 206

[5] CW II: 503

[6] CW I. 231

[7] CW I 232

[8] CW I 181

[9] CW IV 167

[10] CW II 390

[11] CW I 125

[12] CW I 369

[13] CW I 370

[14] CW I 28

[15] CW I 370

[16] CW I 370

[17] CW I 372

[18] CW I 372

[19] CW I 373

[20] Charles Darwin, The Origin of Species (Penguin books Ltd , 1974) (first pub 1859) 455

[21] Darwin Origin 359 (closing words)

[22] CW V 270

[23] CW II 137

Chapter 4

[1] CW II: 138

[2] CW II: 424 (1897)

[3] "Nikola Tesla" in The Online Edition of Grolier's Academic American Encyclopaedia (Grolier Electronic Publishing , copyright, 1994) Compuserve Reference Forum
Tesla (1856-1943) devised alternating -current systems which underlie the electrical power industry. He worked for a time with Edison who wanted to develop a supply grid based on direct current, but he soon joined with G.Westinghouse and Westinghouse bought the rights to Tesla's motor in which two coils were set at right angle to each other and supplied with a.c. and so produced a rotating magnetic field. Although Westingouse and Tesla were successful in their rivalry against Edison, Tesla did not make any fortune from his work and was a somewhat eccentric recluse. He did not, as he hoped he had, produce a successful theory expressing force and mass in terms of energy; this was left to Albert Einstein in his famous equation $E = mc^2$.

[4] CW V: 101

[5] CW I. 14

[6] CW I : 353

[7] CW I: 360

[8] CW II . 438

[9] CW I . 265

[10] CW I: 360

[11] CW II: 305

[12] CW II: 449

[13] S. Radhakrishnan and C.A. Moore A Source Book in Indian Philosophy (Princeton, Princeton University Press, 1273) 356 -379
The division is seen in Nyaya Logic. Perception and Inference are the two dealt with most extensively.

[14] CW II: 449

[15] CW II. 205

[16] G. Buhler, The Laws of Manu 2nd ed (Dehli, Motilal Banarsidass, 1964) Chapter 1
These verses show the idea of of formless origin and of cyclicity quite clearly "This (universe) existed in the shape of Dakness, unperceived, destitute of distincitve marks, uttainable by reasoniing, unknowable, wholly immersed, as it were in deep sleep." (verse 5)
From this the "divine self-existent" emerged wanting to create "many kinds from his own body" and he did this by putting his "seed" into the waters "That (seed) became a golden egg, in brilliancy equal to the sun; in that (egg) he himself was born as Brahman, the progenitor of the whole world." (verse 9)
From this the whole universe unfolds. But:
"The (various) conditions in this always terrible and constantly changing circle of biths and deaths to which created beings are subject, are stated to begin with (that of) Brahamn, and to end with (that of) these (just mentioned immoveable creatures)

"When he whose power is incomprehensible, had thus produced the universe and me, he disappeared in himself, repeatedly suppressing one period by means of another " (verses 50,51)

[17] R.S. Ball, "Nebular Theory" in Encyclopaedia Britannica, 9th ed (1875)
The Nebular Theory was first seriously dealt with by Laplace who suggested that the Sun was was a huge, hot rotating gas extending beyond the current confines of the solar system. The gas gradually cooled and hence contracted This resulted in the formation of rings which were probably not uniform in their distribution of matter. The uneven distribution would eventually cause accretions of matter due to gravitatonal attraction and these would become the planets This theory was widely acepted because it acounted for the observed rotation of the planets around the Sun and because Sir William Herschell, after many years of observing nebulae, was able to classify them according to the various stages of evolution predicted by the theory.

[18] Darwin Origin 455

[19] CW I: 127

[20] Thomas Henry Huxley, Collected Essays V (New York, Georg Olms Verlag,1976) 98

[21] CW II: 206

[22] CW II: 207

[23] CW II: 208

[24] Bertrand Russell, History of Western Philosophy (London, George Allen and Unwin, 1961) (first pub. 1946) 462

[25] Huxley, Essays 76 -78

[26] Huxley Essays 81

[27] R.Hooykaas, Natural Law and Divine Miracle (Brill, Leiden, 1959)

[28] CW II 209

[29] CW II 208

[30] Lord Kelvin, (William Thomson) "On a Universal Tendency in Nature ot the Dissipation of Mechanical Energy," Philosophical Magazine, 1852

[31] CW II: 426

[32] CW II 434

[33] CW II 434

[34] CW I: 9

[35] Richard Jones, Science and Mysticism A Comparative Study of Western Natural Science, Theravada Buddhism and Advaita Vedanta (Lewisburg, Bucknell University Press, 1986) 112

[36] J T Merz, A History of European Thought in the Nineteenth Century(4 vols) (first pub 1903) (P. Smith, Massachussetts, 1976) 1V : 594

[37] Merz 1V 594,69

[38] The necessity that observers throughout the Universe should be able to agree on the phenomena observed was the mainspring for Einstein's theory of Special Relativity. Einstein and others realized that the equations of Maxwell's highly successful electromagnetic theory changed if they were put in a frame of reference moving at a constant speed relative to the observer. At low speed this was of no significance but at very high speed they changed so much the phenomena described would change which is to say the observer in the rest frame would see one thing while the observer in the frame moving relative to it would see something quite different. Einstein took it to be axiomatic that phenomena could not change just because of the relative speed of the observer and from this came his theory of special relativity.

Chapter 5

[1] CW II: 442

[2] CW.II: 442

[3] Buhler Laws of Manu 21

[4] Thomas Young quoted in Merz II.18

[5] Eventually it was proved that light waves are electromagnetic waves but this was not initially known for sure.

[6] CW IV: 14

[7] CW II: 136

[8] CW I: 151

[9] How forces can act at a distance is just as much a problem now as it was in the last century. As Maxwell discussed in his "Atom" article, just because we know how objects behave under gravity does not mean know anything about how gravity arises or how it gets from one mass to another. He discussed a 'particle exchange ' theory developed by Le Sage to account for this and this is reminiscent of modern meson theories. Einstein's General Relativity has space itself curving and one may possibly think that space itself has become the ether of past times.

[10] Merz I: 397

[11] Merz I: 456

[12] James Clerk Maxwell, "Atom", Encyclopedia Britannica 9th edition 1875

[13] Maxwell "Atom" 47

[14] Merz II: 66

Chapter 6

[1] CW II 88

[2] CW II 89

[3] CW VII 50

[4] CW II 89 and CW III 342

[5] CW II 461

[6] CW I 363

[7] CW I 363

[8] CW I 363

[9] CW II 275

[10] CW II. 136

[11] CW II 381

[12] CW II 382

[13] Karl H Potter Presuppositions of India's Philosophies (New Jersey. Prentice - Hall Inc . 1963) 122

[14] Potter India's Philosophies 122

[15] Potter India's Philosophies 127. 128

[16] Potter India's Philosophies 93

[17] Potter India's Philosophies 100

[18] CW I 363

[19] CW I 363

[20] CW II 135

[21] CW II 135

[22] Potter India's Philosophies Chapter 1.

[23] CW II: 136

[24] CW V: 276

[25] Potter 7,168
The concept of Maya is closely associated with the name of Sankara and all Advaitists had to deal with it. The biggest problem was the question of its origin, or perhaps more precisely, its cause - first or final- and this question raised answers falling into two general divisions. Some argued that the "primal ignorance" was in Brahman (brahmasrita) ; this was the Virana school and its chief member was Padmapada. Others argued that the ignorance was in the selves or souls (jivasrita); this was the Bhamati school and Vacaspati Misra's name is associated with it.

[26] CW II: 89-92

[27] CW I: 335

[28] CW II: 128

[29] CW II: 283

[30] Potter India's Philosophies 7

[31] Potter India's Philosophies 95

[32] CW II: 139, CW VI: 482

Chapter 7

[1] CW I: 9

[2] CW I 9

[3] CW II: 12

[4] CW I: 181

[5] CW II: 16

[6] CW II: 16

[7] CW I: 172

[8] J A Hill, Spiritualism (New York: George H.Doran,1919) 55

[9] Ann Braude, Radical Spirits: Spiritualism and Women's Rights in Nineteenth Century America (Boston: Beacon press, 1989) 178, 182 - 189.
All these three groups differed from each other significantly. Spiritualists believing that the spirit survived after death and being capable of communicating with the living to impart all kinds of knowledge some of which could lead to healing The Christian Scientists did not recognize a difference between spirit and body and hence believed that sickness was ephemeral and could be made to disappear by force of will. Where neither of these believed their skills or knowledge were special or contrary to the laws of nature, the Theosophists believed that the action of mind upon matter could only result when certain secret, occult knowledge had been mastered.

[10] CW I: 159

[11] CW I: 158

[12] Hill, Spiritualism, 79
T.H.Huxley for example, refused to take part in the 1869 investigation by the Dialectical Society saying that even if he were to believe in spirits, he found their so-called communications to be little more than gossip.

[13] CW I: 159

[14] CW II : 12

[15] CW II: 12

[16] CW II, 20 - 21

[17] D.S.L. Cardwell, Technology, Science and History (London, Heinemann, 1972) 50-51, 79 - 84
Newton's experiment to analyze the spectrum of white light was seminal The work of John Smeaton (1724 - 1792) in the systematic investigation of water-wheels was the first outstanding example of the new experimental method applied to technology; he recorded more than 130 experiments complete with data and calculations in this study

[18] CW I : 137

[19] CW 1: 163
The Sushumna is the canal in the middle of the spinal column through which electrical nreve currents can flow without fibres. In most people it is blocked, but it can be opened by the practice of Raja Yoga.

[20] CW I; 139

[21] CW I: 139

[22] CW I: 147

[23] CW I: 150

[24] CW I: 152

[25] CW I· 148,153.

[26] CW I· 148

[27] CW I: 149

[28] "Theodor Schwann", " Justus Liebig", Rudolf Virchow", Grolier's American Encyclopaedia (Compuserve Reference Forum)
The German physiologist Theodor Schwann, 1810 - 1882, with Matthias Jakob Schleiden, is credited with formulating the cell theory: the theory that all living things are composed of cells. He published this in 1839 (Schleiden, developed the idea that the cell was the basic unit of plants and that growth consisted of production and development of new cells)
Justus Liebig, 1803- 1873, was a major German chemist whose chief contributions were in the new field of organic chemistry. Liebig's early chemical investigations had to do with perfecting the methods of organic analysis. He devised a procedure of quantitative organic combustion that was used into the twentieth century. Before Liebig began to publish his views on physiological chemistry, physiologists paid little attention to the chemical aspects of their subject.
Rudolf Carl Virchow, 1821 - 1902, advanced cell theory and developed the

science of pathology. He established the principle in biology that "all cells descend from other cells"; he also studied cell function in disease.

[29] "Heinrich von Helmholtz", Grolier's American Encyclopaedia (Compuserve Reference Forum)
One of the 19th century's greatest scientists was Heinrich von Helmholtz,1821-1894. He made important discoveries in physiology, optics, electrodynamics, mathematics, and meteorology. Helmholtz rejected the prevalent concept that life processes involve nonphysical vital forces. He, Emil Du Bois-Reymond , 1818 - 1896, and Karl Ludwig, formed the mechanistic, school of physiology, which attempted to explain physiological phenomena in terms of physics and chemistry. Between 1843 and 1847, Helmholtz applied these principles to animal heat and muscle contraction This led to his classic paper, "On the Conservation of Energy" (1847), in which he outlined the philosophical and physical basis of the law of the conservation of energy although he was not the first to have done this. He studied the sensory physiology of both vision and hearing, breaking new ground in both cases. He later became interested in electrodynamics, which he attempted to relate to the conservation of energy.

[30] Merz, European Philosophy II: 377
It is also interesting to note that Lord Kelvin reported in 1852 that Liebig had told him twenty five years earlier that he would "more readily believe that a book on chemistry or botany would grow out of dead matter by chemical processes" than he would believe that a leaf or flower could grow by the same chemical forces (Merz II· 405)

[31] Huxley, Essays V 85

[32] CW I : 150

[33] CW I 150

[34] The soul and vital force may not be identical; it could be that vital force is an attribute of the soul. However, for the purposes of this discussion they are identical since we are concerned with the appearance of the attribute, vital force, which can only occur if the soul is present

[35] CW I: 174

[36] CW I. 186

[37] CW I: 186

[38] CW I: 130

[39] CW I: 185

[40] CW I: 188

[41] CW 111: 210
Vivekananda also was proud that his philosophy was not dogged by occultism which he deplored. This was one of his difficulties with the Theosophists and he was delighted to say that "all their abracadabras fall off of themselves" when they see the truth of his teaching (CW VIII: 346)

[42] CW I: 188

[43] CW I: 186

[44] CW I: 177

[45] CW II: 390

[46] CW I:130

[47] CW II: 15

[48] CW II: 18

[49] CW II: 19,157

[50] CW I: 195 -313

[51] CW V: 183

[52] CW IV: 194

[53] George M. Williams, "Swami Vivekananda: Archetypal Hero or Doubting Saint", Religion in Modern India ed. Robert D. Baird (New Delhi, Monohar Publications, 1981) 205 - 209
Swami Vivekananda, then Narendranath Datta, met Sri Ramakrishna for the first time in November 1881. From the first, there was a psychical or mystical element in the relationship. Ramakrishna claimed that Naren was the reicarnation of one of the seven ancient rishis It seems that throughout their master/disciple relationship, Ramakrishna's touch was sufficient to put Naren in an altered state of consciouness. Despite Naren's apparent wariness, almost fear of these effects, it has been suggested that they were induced hypnotic trances. Given Vivekananda's own revulsion to hypnosis, and his lack of enthusiasm (normally required for hypnosis), I think this remains an open question.

[54] CW II: 20

[55] CW IV: 193

[56] Geoffrey K. Nelson, Spiritualism and Society (London, Routledge and keegan Paul, 1969) 136 - 140

[57] "Sir William Crookes",in C.C.Gillespie, ed. in chief, Dictionary of Scientific Biography (N.Y. Scribner, 1970 -)111, 475.
Lived 1832 - 1919

[58] Hill, Spiritualism, 84

[59] Hill, Spiritualism 78,91

[60]Hill, Spiritualism 99

[61] Hill, Spiritualism 168
Nelson, Spiritualism 81

[62] Huxley, Essays, 196

[63] Huxley, Essays ,195

[64] Huxley, Essays ,198

[65] CW I: 169

[66] CW I: 181

[67] CW I:185

[68] Harvey D Egan, S.J. , What Are They Saying About Mysticism (New York, Paulist Press, 1982)
This gives a critical overview of mystical experience in both the East and the West and shows the universality of the experience together with differences which occur.

Chapter 8

[1] quoted in Asa Briggs, A Social History of England, (Penguin books Ltd England, 1983), 229

[2] Cosslett, Science and Religion, 3

[3] CW II: 433

[4] CW VI: 81

[5] CW I: 370

[6] Barbour, Issues 1

[7] Barbour, Issues 4

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