Chapter 5

Science, Empire and ‘Cultures of Knowledge’ in Amitav Ghosh’s Selected Works: Concluding Remarks

These stories amazed Paulette. Fitcher was so unlike the plant collectors of her imagination, so peculiar in mannerisms that it was hard to imagine him as an intrepid traveler. But Paulette knew from her father’s accounts that even Humboldt, the greatest collector of all was utterly unlike his legend – stout, dapper and so much the boulevardier that people who sought him out often thought they had encountered an imposter. (River Of Smoke 99)

This exploration unravels the underlying cultural and philosophical underpinnings of the enterprise of science especially in the context of colonialism and as it emerges through the writings of Amitav Ghosh. One rationale of doing this is to unveil the ‘shadow lines’ demarcating science as a privileged activity, immune from the social impulses of the times. Science, which is assumed to be divorced from socio-cultural elements and thus fashioning itself in a vacuum of sorts (in such transcendence is also said to be located its chief strength), is seen in this study as being fashioned by the philosophical underpinnings of the age. But, more fundamentally, the present attempt to focus on science is to underscore the intimate relation it has had with colonialism.

Both as a ‘tool of empire’ in its instrumentalist use of science and technology to help the advances of imperialist powers and also, equally powerfully, science as a discourse of power- emphasising its importance in putting the imperialist powers in a far more powerful position vis-à-vis the parts of world they were out to subordinate. So machines not only became the ‘measure of man’ but also the very rationale for the Empire in the first place. Empire was predicated on science as a touchstone and it becomes meaningful to understand the dynamics of science both as a discipline and practice in these times.
Amitav Ghosh has been sterling in his numerous attempts to capture this complex exchange during the colonial encounter through his numerous works. His stance lends itself to this kind of a reading more so because of his affinity with the ‘spaces within the categories’ rather than categories themselves. (Hawley 5) Apart from analysing the dynamics of the introduction of western science in India, this study revisits the epochs of Romanticism and Victorian times, as two distinct ‘cultures of knowledge’ in the metropolis that charted the progress of science in these contentious times.

The present study situates science in the aforementioned ‘culture of knowledge’ as a context that has powerful bearing on the practice of science as a discipline. Since this study takes the context of colonialism as the backdrop to the spread of western science to India, the dialectics of this exchange are attempted to be understood. To underscore the complex nature of this exchange, Arnold observes that ‘...far from being monolithic, (science) manifests itself across time and cultures in myriad forms, reflecting as much as informing a given society’s cultural, economic and political modalities.’ (Arnold 1). He further emphasises upon this need – ‘the more historians take into account the ideological dimension of science, technology and medicine, the more we move from seeing them as ‘tools of empire’ to explore their social, cultural and political dimensions, the more apparent it becomes that there was no simple, one-directional process of scientific and technological transfer, but a series of cross-cultural exchanges and interactions.’ (Arnold 211)

Deepak Kumar in his Science and the Raj (1995) emphasises the need to embrace this dialectical view of exchange of ideas as opposed to a one-dimensional imposition of western science on India. He says: ‘It would be wrong to argue that in a colony ideas were not generated but were imported or received. Even if they are imported, ideas are not like ‘finished products’ and cannot be consumed ‘neat’ by the recipients. They undergo processes of refinement and sometimes distortion, and at times they change for good or worse, even beyond recognition. The crucial question here is: how does this happen and what impact it leaves on colonial relations or even internal power-equations.’ (Kumar 17)

A reassessment of western response to science is undertaken from the Romantic times onwards because Romanticism itself was a reaction against Industrial
Revolution and espoused a nature-centric approach to science. The philosophical spirit underlying Romanticism, together with the academic and cultural exchange, is seen as constituting a definitive ‘culture of knowledge’ and driving the direction of science as a discipline as well as influencing its core ethos. This was followed by an aggressive phase of colonial expansion in the Victorian times which ensured the enshrining of the mainstream Newtonian science as the ideal that spurred progress. The study examines in detail, the Victorian times as a volatile epoch of change and progress. Whereas, the Darwinian theory did shake the firm moorings of religion for the ordinary Englishmen, the ascending tempo of colonialism enshrined the new religion of progress. Through an engagement with the underlying philosophical ethos of these times, a case has been built about its influence on the growth of science as a discipline.

The study then takes a closer look at the encounter of Indian experience with western science as it came in varied avatars of technology, theory and discipline with the march of Imperialism. A mention of Amitav Ghosh’s engagement with this aspect of colonialism ought to be made here. His nuanced portrayal of the contact between Western science and India of the nineteenth century spans his oeuvre. Also since he is an author whose writing develops from an intensive research of the time and materials he portrays, he desists from painting with a broad brush.

The nuances that are seen in his writing with regard to portrayal of science range from the depiction of characters like Balaram, in whose adulation of phrenology is captured the imitative aspect of growth of western science in India in his debut novel The Circle of Reason (1986), to his portrayal of the many ‘Science Societies’ that mushroomed in premier colleges of Pre-Independence Calcutta- much like the growth of such institutions in Britain during the nineteenth century. His delineation of characters like the Lamberts, in whose approach to science there is a marked influence of Romanticism to the sinister portrayal of the technology of the opium carccana (factory) as a resultant of the odious Utilitarian impulse of the Victorian times. The list is not exhaustive but illustrative and an engagement with these varied facets of science became the very impulse for an initiative like the present one.

To go into greater details of the exploration into Romantic times - this study has aimed at establishing the proliferation of science in the larger ‘culture of
knowledge’ spawned by the Romantic revolt of the late eighteenth and early nineteenth century. It looks at how Romanticism attempted to situate itself as a counterpoint to the mechanistic science of the day and how eventually it was consumed by the sentiment of utilitarianism ascending with the unprecedented economic progress being made with the spread of the colonial Empire of England. It was deemed appropriate to analyse the Romantic Age for an enterprise like this because the romantic spirit essentially got galvanised as a result of the large scale social and ecological cost of the Industrial Revolution. More fundamentally, it was a movement of dissent against the ascending mechanical science, which provided the earliest impetus to the Industrial Revolution. This study has attempted to establish the rather widespread reach of Romanticism and by overstepping the confines of poetry and politics, it is seen as a strong undercurrent that was endeavouring to reshape the dynamics of contemporary science too. The rigid disciplining of knowledge was a later development and this period is also fascinating for its lively and inspirational exchange between poetry and science. As an aside, this fluidity between disciplines can be taken as a model for our refashioning of education to make it more holistic in the contemporary times.

As critics like Makdisi (1998) have established, from the point of view of Colonialism too, this epoch must be understood with greater depth. To be able to understand the science of Empire is really to go back to the Industrial Revolution itself, which Romanticism set out to critique. The Romantic spirit in its heyday influenced the practice of science just as we are all too familiar with its influence on literature. The veneration of nature was harking back to ‘simpler times’ that were pre-industrial and an attempt to connect to a higher power than focussing on material production alone. Romanticism heralded a markedly new sensitivity towards nature which viewed it as a fountainhead of energy that travelled through men, flora and fauna alike. (Whitehead 103)

Nature represented a superior intelligence that loomed in the backdrop like the towering dark mountain in Wordsworth’s The Stolen Boat. It was assumed to have the power to enter man’s recesses like a spirit. The science current at this time was observational in nature and there was an attempt being made to catalogue the diverse life forms according to Linnaean taxonomy. This study predominantly looks at
Botany in this regard because of Ghosh’s portrayal of the vicissitudes it underwent at this time. The diversity and variety inherent in the plant life in nature were sought to be captured through Botany. Whether one did through poetry or science did no matter much- the spirit that pervaded these investigations were almost identical in its veneration of Nature and divine design and it was not unusual to find Botanists who were poets and vice versa. It would however be somewhat hasty to dub the whole Romantic Movement as occupying this otherworldly bastion where nature presides over as the deity. It was also a fiercely social movement because as discussed before, it was in a very important way a reaction to the social effects of the Industrial revolution. It was an attempt to show the possibility of an alternate tangent along which progress was possible as against the lopsided industrial growth England was witnessing at this time. Romanticism offered an alternative to the mechanistic, commercial ethos that was beginning to permeate the society.

The centrality accorded to Nature as a force and entity springs out of veneration towards life, perhaps the most vital characteristic of Romanticism. There is an exchange between the organic and inorganic realms that is sought to be unravelled through science. Science is an extension of this piety through which nature is to be better understood. The dialectics of exchange between man as an element of nature as opposed to the modern conception of man as being in opposition to nature is the bedrock of this understanding of science. The enterprise of science to the romantics was to teach man to better understand the bounty and beauteousness of nature. The venture to identify new species of flora and fauna which hit a high point at this time too added to the vitality of nature. The science of Botany, an important part of which was ‘botanising’ in wilderness and hitherto unexplored lands presents a striking picture of the very first scientific expeditions. Romanticism was opposed to the exploitative practices that were stemming out of the application of principles of the ascending Newtonian science which led to the Industrial revolution and its subsequent desire to multiply markets due to overproduction- a singularly important impulse for the enterprise of Colonialism.

Amitav Ghosh, as pointed out in the beginning, has tried to capture the spirit of Romanticism in the character of the scientist Pierre Lambert and his daughter Paulette and pointed at the diversity of beliefs governing science in this period. This
exploration about romantic science arrives at the fascinating insight that the metropolis was a site where the wider culture of knowledge and philosophy was impacting the growing enterprise of science in very interesting ways. The Romantics were apprehensive about the imbalance between nature and man that was being accelerated by the new definition of progress, and in this way, they can be acknowledged as the first ecologists. This sentiment was in sharp contrast to the Victorian quest for exploiting nature both at home as well as in the newly acquired colonies in the name of progress.

Forests were set on fire— but hour by hour
They fell and faded— and the crackling trunks
Extinguished with a crash— and all was black.

Byron ‘Darkness’ (II. 19-21)

One of the most important insights of this work is the consciousness of the Romantics to the adverse impact of exploitative practices of science on nature. If the ascending Colonialism had not put the premium it did on production and markets, the more empathetic view of nature espoused by the Romantics could have led the world in a direction that would not have been fraught with violence and plunder to the environment as the one fashioned by mainstream western science was. Analysing the two underlying emotions, viz: the romantic love of nature and terror in upsetting the fundamental equation between nature and man, this study has argued that the Romantics can be considered as early ecologists. It has been iterated before and should yet be emphasized that Romanticism as a movement comes out of a context that is reeling under the effects of Industrial Revolution. It is an appeal to go back to the former, more pristine environs.

What is also emphasized through Romantic poetry is man’s fundamental bond with nature: in ‘The Stolen Boat’ (an extract from The Prelude Book I) by Wordsworth nature becomes a witness to the act of theft (of a boat) committed by the narrator. However the presence of the towering mountains behind ‘a huge peak, black and huge/ as if voluntary power instinct/ upreared its head...with a purpose of its own/ and measured motion like a living thing/ strode after me.’ (23-28) The mountain
constantly seems to prod his consciousness into admitting a feeling of guilt. The mountain becomes his super-ego displaced in space, or perhaps the source of the Divine voice that awakens the consciousness within him. By situating the very social act of thieving at the heart of the poem, Wordsworth tries to raise the more fundamental question of the equation between the ‘social man’ and nature. It is what the ambition of man has wrought over nature that leads us to considering the ecological perspective in Romantic works. When one sees nature as central in exploring the science of these times, it is not very hard to see the relevance of an ecological perspective especially with regard to the Romantics.

As James C. McKusick discusses, the word ‘ecology’ is derived from the Greek word oikos meaning house or dwelling place and ‘the poetry of Wordsworth and Coleridge clearly foreshadows the modern science of ecology in the holistic conception of earth as household, a dwelling place for an interdependent biological community.’ (202). Both poets were long time inhabitants of the Lake District and ‘more than just itinerant observers of picturesque beauty, their poetry adopts the persona of a speaker whose voice is inflected by the local and personal history of the place he inhabits. Such a perspective may legitimately be termed as an ecological view of nature since their poetry consistently expresses a deep and abiding interest in the Earth as a dwelling-place for all living things.’ (202)

According to McKusick, the Romantic understanding of nature may authentically be termed as ecological since ‘for the first time in the Western intellectual tradition their poetry evinces the essential elements of a modern ecological worldview...a sensibility that understands all of nature to be constituted as an assemblage of biotic communities characterized by diversity, complexity and symbiosis.’ (209) They alluded to the impending environmental doom that stares the civilisation in face. According to Pite, Apocalypse is a theme that has been written about in the Western Civilisation since as far back as Genesis and the doom envisioned in the Book of Revelation. ‘But the dawn of Industrial revolution marked the first time that such apocalyptic events were imaginable as a result of normal human activity, rather than an inscrutable act of God. In the early years of the nineteenth century, as the manufacturing cities of England disappeared into a thick haze of photochemical smog, it became possible to imagine that the new technologies
of mass production might alter the climate and eventually destroy the Earth’s ability to sustain life.’ (McKusick 207)

Critics like Jonathan Bate\(^3\) too have tried to analyse the Romantic poets as the first proponents of Environmentalism. Bate in his book titled *The Song of the Earth* (2000) argues that the ‘litany of present and impending catastrophes is all too familiar.’ The doom is staring at us in the face is due to the large-scale and an array of human caused environmental hazards. And even though most people realise the quantum of threat it poses, remedial action has not been forthcoming in the expected manner. He suggests the use of literature as a potential way of altering our worldview because according to him what is required in the present circumstances is not a technological quick fix but a change in human consciousness. In this light attempts have been made to see the Romantics as embodying this consciousness of a balanced relationship between nature and man that got eroded with the rising graph of western progress especially the growth and spread of colonialism. Bate’s argument about exploiting literature for affecting this change in mindsets regarding ecology can be extended to underscore the relevance of the present study too. For the present study, this engagement with the ecological question is significant because it points at the more fundamental view of nature in Romanticism as a philosophy, which, in turn, fashioned their philosophy of science.

It is precisely this ‘Romantic’ sympathy to the environment in general and to the plants in particular that Ghosh shows through the portrayal of the father-daughter duo, the Lamberts in their approach to Botany as a science. Their attitude to plants in the Calcutta Botanical Gardens is one of veneration and wonder and Pierre Lambert’s attempts to catalogue them using the Sanskrit appellations points at the Romantic attempt to place science within a specific cultural context for it to retain its essence. It is counterpoised as a foil to the excessively utilitarian ethos of the Fletcher, a businessmen dealing with plants in the novel.

To understand the philosophy of the Lamberts required an attempt at unearthing the differing impulses in the intellectual horizon of Europe at this time and this became an important course charter for the present study. The Lamberts defy a simplistic Postcolonial analysis and called for, like Uberoi says in *The Other Mind of Europe: Goethe as a Scientist* (1984) ‘a recognition of non-standard methods of the
organization of knowledge— in the sciences and the arts, within and without the university, and other principles of the relation of knowledge to life whether European or non-European...this in turn requires independent studies of the development of modern European culture, not only in its relation to India and Asia during the modern colonial periods but also in relation to itself.’ (9) This became an important impulse in revisiting the epochs of Romanticism and Victorian times in reassessing the history of thought as far as science in Europe was concerned. What emerges from these facts as an important insight is the position accorded to nature as an entity is a commentary on the philosophy underlying the differing approaches to science in these two epochs.

Yet another dimension that this study has looked at, with reference to Ghosh’s novels is the arrival of exploratory voyages and colonization. Holmes mentions that the idea of an exploratory voyage, often lonely and perilous is in one form or the other a defining metaphor of Romantic science.’(xvi) The realm of literature too was mirroring these voyages being undertaken on the strength of improved seafaring and navigational skills and the quest for discovering far flung lands.

However Coleridge invokes a very important ecological strand in his *The Rime of the Ancyent Mariner*, (first appeared in 1798 and then as revised edition in 1817) with the sea voyage over perilous seas and the mariner’s fear of creatures known and unknown, natural and supernatural quite captures the spirit of these times. The mariner kills an albatross and invites a curse to fall upon his mates and vessel. The mariner lives to see the frightening consequences of this curse and one by one, his mates die. At this point he sees a pale woman ‘...Her lips were red, her looks were free/ Her locks were yellow as gold/...the night-mare Life-in-death was she...’ (186-190) who is death herself and feels exhausted and beaten under her spell. Later in the poem he unwittingly blesses the sea creatures that he sees shining in the moonlight. ‘a spring of love gusht from my heart/ And I bless’d them unaware!’ (276-77) Before he knows it, the curse of the dead albatross is reversed owing to his praise of nature and his crew members spring back to life again. His innocent blessing of sea animals becomes the turning point in his journey and his voyage comes to a successful end. The poem is told as a story by the presently old mariner, much in the
vein of the yarn spun by sailors for the benefit of listeners in a wayside inn. There is a ‘moral’ of the story too, which is stated by the mariner as follows:

He Prayeth well, who loveth well
Both man and bird and beast
He prayeth best, who loveth best
All things both great and small
For the dear God who loveth us,
He made and loveth all. (647-652)

The poem brings together two powerful tropes of the Romantic imagination: the exploratory voyage to unknown lands and second, the acknowledgement of nature’s superior power over man. The poem concludes with an insight about the manifestation of the spirit of God through the most infinitesimal creature, the careful observation of which will help us get closer to God. The poem, which is considered one of the greatest by Coleridge, is very useful in discussing the nature of Romantic imagination as it touched on all spheres of existence and became a link between science and poetry.

Some critics like McKusick have also proposed reading the poem as a ‘fictional narrative of ecological transgression.’ (211) He explains in this light that the mariner embarks on this journey as a ‘philosophical dualist- a detached observer who is cut off from any feeling of empathy or participation in the vast world of life that surrounds him.’ (211) The albatross signifies the link between nature and the world of men and the link is snapped with the arbitrary act of the mariner by which he kills the ill fated bird with his cross bow. The weapon embodies the destructive tendencies of the European technology. Nature however unleashes its vengeance upon the mariner by killing all the men on the ship. This is the price they have to pay for disrupting one link in the chain of nature.

Historically James Cook’s expeditions (1772-5) into the Antarctic region had discovered the abundant flora, fauna and subsequently led to a wholesale destruction of seals, whales, birds and other marine animals. Coleridge also talks about the ‘host
of fellow travellers’ that is trailing the ship. McKusick explains: ‘Any wooden sailing ship in tropical waters will gradually accumulate a host of fellow travellers- ranging from barnacles and seaweed to schools of fish that shelter within her shadow. The ship comes to resembling a floating reef, and a teeming flora and fauna offer both perils and opportunities to those aboard her.’ (212) …‘This abundance and variety of marine life is what Coleridge calls ‘the shadow of the ship’ was a cause of wonder and amazement for many British explorers.’ The ship en voyage, develops its own eco-system and eventually the water snakes that the mariner blesses are part of this floating marine life that clings to the ship’s hull. The blessing eventually reverses the curse. Through this reading the critic suggests that the poem ‘foreshadows some of the most seminal thoughts of contemporary environmental writers.’ (213)

The exploratory voyages of this time had both imperial as well as scientific purposes. These naval expeditions from Europe in the search of unexplored lands, therefore invariably began with the convention of having botanists and zoologists on board: who could also do their job while the imperial aspect was being taken care of. So whether it was Joseph Banks on board the Endeavour, Charles Darwin on board the Beagle- they were all inescapably part of the imperial expeditions in search for new lands.

As the earlier discussion shows, this influence has been captured most markedly on the subject of Botany through the two titles of Ghosh’s Ibis Trilogy The Sea of Poppies (2008) and The River of Smoke (2011). In delineating a character such as Pierre Lambert, he has shown us the Romantic influence on science. Here is a man who is a misfit of sorts in the colonial milieu dominated by the likes of Fletcher, the trader of plants. His approach towards science is also highlighted as a foil to the looming presence of the shipping magnate, Burnham- a characteristically Victorian character, who is Utilitarianism personified. Lambert, the Superintendent of the Calcutta Botanical Gardens has a view of knowledge that sees the diversity of fauna as an aspect of divine bounty:

If Botany was the scripture of this religion, then horticulture was its form of worship: tending a garden was for Pierre Lambert, no mere matter of planting seeds and pruning branches - it was a spiritual discipline, a means of communicating with forms of life that are
essentially mute and could be understood only through a careful study of their own modes of expression- the language of efflorescence, growth and decay: only thus he had taught Paulette, could human beings apprehend the vital energies that constitute the spirit of the earth. (River of Smoke 78-9)

As mentioned before, Botany too was at a stage when more and more species were being catalogued according to the Linnaean taxonomy. Pierre is identifiable with William Jones because of his preference for Sanskrit appellations for the plants that are being catalogued. His Botanical Garden was a nurtured Eden of sorts, which was a haven for his motherless daughter Paulette. She grows up in the garden virtually as a child of nature, oblivious of the many injustices which were rife in the sleazy precincts of Calcutta, the colony. She grows up to be a Botanist in a world of science that is a fiercely male-dominated domain. In her freedom loving, liberated nature one can see the stamp of Romanticism.

This influence on her personality becomes more evident when she has to perforce, move in with the Burnhams after her father’s death. She feels claustrophobic in a household dominated by Victorian prudery, narrow religiousity and social hierarchies. Ghosh has shown these two worlds apart: the Lamberts with their nature-venerating knowledge and the Victorian Utilitarianism of the Burnhams. Through this study an attempt has been made to see these two influences on the science of the day. Further these diverse ‘cultures of knowledge’ were contingent upon the existing socio-economic climate of the time. One of the most important of these influences was the contact with other cultures through the spread of colonialism. This, in turn intensified the need to nurture the industrialisation at home - which subsequently led to the rise of Utilitarian ethos, completely drowning the Romantic sentiment about nature in a cacophony of the chants glorifying the new religion- progress.

The fundamental attitudinal difference between the two epochs under discussion here also impacted the western view of the existing fund of scientific knowledge in India during colonial times. The legacy of William Jones’ Asiatic Society which was instrumental in showcasing Indian scholarship to the West is discussed in great detail. For all the aspersions that are cast on his motives as far as his knowledge of India is concerned, one has to concede that he acknowledged the
Indian sources of knowledge. Whereas there are some like Said who claim that he was in India to tabulate and codify information for the sake of assisting administration, one can certainly see his approach as being different from that of the Utilitarians, whose harangue soon overtook his Romantic moorings. (See discussion in Kaul) The likes of Mill now entered India with a new discourse to belittle all existing fund of Indian knowledge as worthless. What effected this change was the \textit{zeitgeist} or spirit of the times that was about to use the discourse of ‘knowledge as power’ in affirming the superiority of West in instituting its power in India.

As Deepak Kumar argues: ‘Under Baconian epistemology that he (Mill) had inherited, all knowledge could be translated into technical control. The same Western sense of cultural superiority also indicated the impossibility of all men attaining knowledge and power in equal measure. So the colonizer had the added advantage of not only claiming a monopoly over knowledge but, at the same time, condemning ‘other’ epistemologies as worthless or antiquated. (Kumar 33) This study situates Jones as a Romantic who was the classic amateur scientist, given passionately to his scholarly pursuit, a role mode for the characterisation of Pierre Lambert.

The discussion in the study then moves to the Victorian times with the Utilitarian greed as its ethos and its impact on the practice and institutionalisation of science in Britain as well as in India. This is the era of progress and by extension, progress understood in: sheer economic terms. The optimism about science and the ensuing progress is the dominant spirit of this age. Deepak Kumar points at the stance of this brand of science: ‘...wherein the result-oriented research in applied science heavily supersedes the curiosity-oriented research in pure science.’ (1) He further quotes Donald Fleming who says that ‘reconnaissance of natural history provided the leitmotif of the scientific enterprise in the nineteenth century. These investigations flowed without a break from the combination of practical and speculative motives that triggered the colonial enterprise itself. After all, the environment had to be mastered and its economic potentialities properly canvassed.’ (2)

In this regard Kumar further says that Fleming identifies some features of this brand of science, one of which is that the European scientists like Linnaeus and Banks behaved like ‘absentee landlords’ ceaselessly commanding and receiving tribute (data) from the ends of the earth...the result was that the ‘natural history man’ looked
like a variant of the ‘economic man’ and not very different from an explorer, planter or colonizer. (Deepak Kumar 2-3) He further claims that as far as the scientists in the colonies were concerned, ‘they increasingly came under the purview of the official knowledge with its hierarchies, rituals etc. The state involvement, made colonial science more ‘utility oriented’. In Britain itself there had occurred a gradual shift from science-as-avocation to science-as-enterprise. In the wake of the Industrial revolution there had developed an entrepreneurial ideology of science…men who mattered began to look for utility or result oriented science.’ (15-16) Thus one can see the shift from a Romantic conception that viewed science as a means to unravel the bounty of nature as opposed to the Victorian times when science became a handmaiden of colonial enterprise.

Science is also staged as the wonder of the times. In Britain, through the display of cutting edge technology for the benefit of the lay people at the Grand Crystal Palace exhibition (1851), science became the panacea of the ills and passport to unprecedented economic progress. According to Prince Albert, the purpose of this exhibition was ‘to give us a true test and a living picture of the point of development at which the whole of mankind has arrived in this great task of applied science and a new starting point from which all nations, will be able to direct their further exertions.’ (quoted by Ping 1) The exhibits were displayed inside the grand edifice of glass and steel designed by Joseph Paxton and erected in the precincts of the popular Hyde Park in London. Planned under the royal auspices of Queen Victoria and Prince Albert, the exhibition stirred many in the direction of the new religion of modernity, science.

Prince Albert’s opening speech touched on the changing dynamics between nature and science. He said in this regard that ‘man is approaching a more complete fulfilment of that great and sacred mission which he has to perform in this world: to conquer nature to his use …In promoting (the progress of the human race), we are accomplishing the will of the great and blessed God.’ He was mouthing the sanguine optimism for science in the Victorian times – ‘Science discovers laws of power, motion and transformation; industry applies them to raw matter, which the earth yields in abundance, but which become valuable only by knowledge.’ (Ping 2) This speech by Prince Albert captures the essence of the argument about the nature of
science in Victorian times as being more aggressive, a central concern in this study. The rather evangelical purpose of science as a ‘sacred mission’ and ‘will of God’ is also a very Victorian ideal. According to Ping, the Great Exhibition of 1851 was a hymn of praise for the idea of progress. (2) As Gyan Prakash says: ‘they classified, named, mapped and ordered non-western people and things to realise their desire for domination. In this project, no less important than establishing standards of art, aesthetics, history and identity was the staging of Western science as universal knowledge.’ (Prakash 19)

However within the space of the colonies, these exhibitions and museums became the instruments of the civilizing mission for, ‘these not only defined what constituted art, culture and history but also showcased scientific knowledge and instruments as technologies of governance and improvement ...Collecting, Cataloging, classifying and displaying objects, these institutions sought to establish the universality of their classificatory enterprise and to position science as a sign of modernity and means of colonial rule.’ (19) Gyan Prakash sees this ‘staging of science’ as playing a crucial role in the spread of colonialism. Prakash sees the use of staging of science as a means of fashioning Western knowledge’s self identity, initially in the foreign and exotic material accumulated in the cabinets of curiosities and later in the burgeoning colonial spoils displayed by metropolitan museums and exhibitions.’ (47)

Assuming the natives to be largely superstitious with a belief in for magic, the British thought of displaying ‘science as magic.’ The relay of messages over telegraph, the wondrous display of brilliant colours arising out of chemical reactions, were staged to arouse awe in the minds of the natives. This became the conduit for then familiarising them, inter alia, with science as a discourse of power. The discussion attempts to make connection with this larger politico-economic climate with the unfolding of the practice of science at this time.

Coming back to Ghosh’s portrayal of Botany for instance, which was shown ensconced in the Romantic worldview as the divine play of munificence is now seen as a lucrative commodity for overseas trade. The Botanists working in India now directed their energies to the task of extracting materially beneficial products and by-products from plants. Opium, exemplifies the nadir of this obsession and in so doing had allowed economics to take precedence over every other purpose in their
exploitation of natural resources. Victorian times are also the times of increased scepticism about belief in God as well as excessive religiosity. The Darwinian theory of Evolution spurred a deep scepticism about the age-old conception of a divine source of life. In this backdrop one can see how the divine bounty that was sought to be discovered through botany is replaced by a more immediate motive- that of making material advances for the Empire. Ghosh more than hints at this transition through his portrayal of scores of Botanists moving into India to discover plants that could be beneficial sources of commodities that could help spur trade for the Empire.

Apart from the Utilitarian strand in viewing Botany as a means of material exploitation of plants, the study also establishes that pseudo race theories were embraced and sanctified by science. In this milieu, comparative anatomy or phrenology became the most important empirical element of race science. It became a ‘scientific’ vehicle for providing empirical support for the belief that European race was superior to all others. It worked on the principal that by measuring the shape of the skull one could ascertain the internal structure of the brain and thereby determine racial and individual differences in intelligence, temperament and morality. Phrenology was extensively applied at home and colonies and head shape was assumed to be the stable indicator of racial difference. The use of phrenology strengthened the ‘European’s conviction that they were destined to be the masters of humankind and served as a means of reminding bright and uppity African and Asian subordinates of their proper place in the larger scheme of things.’ (Adas 296)

In so doing they drew up a hierarchy of race relations in which the whites were considered the most superior and Africans occupying the lowest rung. Darwin’s theory added a strand of competitiveness in the Victorian conception of race relations. Competition as opposed to Cooperation became the benchmark in race relations. This study looks at several manifestations of Social Darwanism which Darwin himself had no way of foreseeing. Once the Darwinian thesis came on board, it was interpreted and misinterpreted by people from across the political and also economic spectrum to suit their own agendas.

The theory put forth by Darwin was also subsequently misinterpreted to explain the hierarchy of race relations- this can be seen to be a case of politics.
affecting science in a rather direct way. The increasing clout of the Empire led some scientists to forward the despicable theory, after Darwin, that races too are in an evolutionary contest-pitted against one another, emerging victorious after evolving to another level. This was followed by the introduction of pseudo-sciences like phrenology to empirically substantiate these theories. In a way, the Empire had found for itself a vindication through the route of nothing less than science itself. This finding is placed alongside Amitav Ghosh’s ironic portrayal of the character Balaram in his debut novel, *The Circle of Reason* (1986). His unreasoning obsession with phrenology as a hobby is ironic given the notorious implications it has in the light of its connections with imperialism. For Balaram to have such feeling for the subject exposes the weak underbelly of Indians themselves who uncritically lapped up western science as the only route available to modernity. In this case science too was complicit with the empire.

Also what emerges from these facts is that the notion of science and pseudo-science are not absolute categories. These veer in the spaces within ‘shadow lines’ that are drawn and redrawn according to the conventions of an age. The inviolable truth of science too is seen to be redefined with time. What is considered science today can with the changing scenario be labelled pseudo-science and vice-versa. In this light the discussion of Ghosh’s novel *The Circle of Reason* becomes pertinent—where the protagonist Balaram is obsessed with the ‘science’ of phrenology. As shown in the discussion above, this was a discipline in which the measurement of skulls was an indicator of intelligence and racial superiority. What was considered a legitimate practice during the colonial era and was fuelled by the belief that there was a hierarchy within races, was eventually abandoned as obscurantist and pseudo-scientific. In Balaram’s unflinching faith in phrenology is hidden the critique of India’s uncritical avowal of western science. This is an instance of science colluding with prejudices of the day and furthering the cause of the Empire and the natives taking it on uncritically and second hand.

In the context of the two powerful ‘cultures of knowledge’ viz- Romanticism and Utilitarianism, this study attempts to focus on the genre of scientist’s biography as a means to popularise science. The emphasis that the Romantics laid on the individual
and personality led to the writing of some of the first important biographies of scientists. In this light the biography of Joseph Banks is extensively discussed in the second chapter. Nineteenth Century saw the burgeoning of this genre to an all time high. With the spread of Colonialism this genre became a means to push the justification of Empire to the colonies. (Chambers in Khair 45) Many biographies of well known scientists were commissioned with the view to portray the scientists as altruistic, noble souls given to the cause of the well being of society. Ghosh, in his novels has played around this genre in very interesting ways.

In *The Calcutta Chromosome*, the story of Ronald Ross is depicted with a rather postcolonial stance. He is not the lone genius toiling at the research problem at hand but a mediocre student pushed into science by his father who is a renowned General in the British Indian Army. The gaps in his knowledge are glaring and the Indian staff at his laboratory get the better of him all the time. One cannot escape the subversive impulse in this attempt. Similarly, in *The Circle of Reason*, Pasteur’s biography reverberates in the text as a powerful means to emphasise Balaram’s obsession with both the book as well as phrenology. The biography is inseparable from Balaram and later has an impact on Alu. His reaction upon listening to the ‘tragic’ tale of Pasteur is always an uncontrolled spell of fitful crying. It seems like an extreme reaction from somebody who is known to be very impassive and stoical, almost to the point of being stony. However the biography and its influence on the protagonists is shown to be linked to the earlier point I have made about Ghosh’s critique of India’s uncritical reception of Western science.

As discussed before on the extensive discussion on this aspect of the novel, the present study has shown how the turn of events lead to the book being burnt on the pyre of Kulfi and how that is a very postcolonial moment in the novel. Biographies of the scientists in the Romantic times are seen as a natural consequence of the importance given to fashioning of personality, however, by Victorian times, it is used as part of the power discourse build around science. By incorporating extensive biographical material on personages such as Charles Darwin and John Banks, this study too profits in making vital linkages about these personalities and the ‘culture of knowledge’ in the times they were practicing their science.
Ghosh’s novels also make a reference to some of the other attitudes prevalent in India about the proliferation of western science. An important socio-cultural impact of western science in India was its marked association with modernity. It beamed on the horizon, seductive with its promise of progress, distinct from the shackles of other markers of identity. The middle classes saw in it the promise of another identity that could act as a passport to the world at large. The science of the west was couched in this vocabulary and was sanguine in its own power to deliver the masses. While most social and religious reformers had a positive stance towards western science which they considered as the new touchstone to purge the religions of the ills that had crept in, there were also some who believed that India has always had a ‘scientific’ basis to its religions and in its books, which got eroded during the ‘Dark Ages’ of the Mughal Rule. This new ‘nationalism’ saw the superiority of India in precisely that it was ‘scientific’ like the West prior to the ‘invasion’ by the Mughals and needed the British to claim that ‘golden past.’

This view was not very different from the ‘Orientalist’ position vis-à-vis Western science- which conceded a tradition of science to India in the distant past but one that got eroded and the ‘present’ day India had nothing in the name of science and technology and needed British rule to amend these ills of the civilisation. The other stereotypes saw India as religious and spiritual even though backward and west as material and scientific. The revisionist historiography attempts to rescue India out of this position and show it as existing in a dynamic world. India was not in a state of tabula rasa upon the arrival of the British but had a formidable tradition of science including medicine. India, before the arrival of the British, was in the forefront as far as the production of cotton, dyes, metal and shipbuilding was concerned and had trade links through the Indian Ocean route as well as in South East Asian countries. All this is however glossed over in the rhetoric of the Utilitarians who wanted to legitimise the presence of the British in a backward state that needed amelioration. David Arnold summarises the condition of Indian science and technology at this point:

From the late fifteenth century onwards, scientific, medical and technological exchanges continued through the agency and impetus of trade and welfare and through the migration of scholars, merchants,
physicians and craftsmen. Contacts flourished in two main directions—
with the wider world of Islam ...but also, increasingly, with the
expanding commercial and technological power of Europe.
Astronomy, medicine, textiles and arm-making benefitted from the
fashioning of an Indo-Muslim polity and culture under the Mughals,
but India also profited in such areas as shipbuilding and horticulture
from contacts after 1498 with the Portuguese and later with the Dutch,
French and English. If there remained a gulf between the craft
technology of the uneducated artisan of the literati, if there were few
individuals before 1750 to whom one could convincingly apply the
term ‘scientist’, then India was in these respects little different from
early modern societies in Europe, China or elsewhere.’...A positive
interest in science ...flourished under royal patronage in the regional
courts of India from the astronomical observatories built by Raja Jai
Singh between 1722 and 1739 at Jaipur, Delhi, Mathura, Ujjain and
Benaras, to the eclectic medical interests and library of Indian and
Western medical texts assembled ...new centres of learning sprang up
like Hyderabad under its Nizams or Lucknow under the Nawabs of
Awadh...Delhi remained a significant locus for science, art and
literature and until the cataclysmic events of 1857, enjoyed a twilight
‘renaissance.’ ’ (Arnold 5-6)

One of the important inferences of Ghosh’s *The Calcutta Chromosome* (1996)
is the issue of indigenous science and the consequences it suffered as a result of
colonialism. Newton’s famous statement about the scientists standing on the shoulders
of the giants to see further than their physical selves allow, referred to the
indispensability of the previous research to build up new inventions and discoveries.
These giants, it so turns out happen to be white.? One sees the enthusiastic drawing of
a continuum on which are marked along with a timeline, all the important discoveries
that have been of some consequence to the history of science. This development,
however, has failed to acknowledge the sources of knowledge other than the West.
One can also see the dire necessity of making the science - west association during the
upsurge of colonialism. As Arnold says ‘...science was also the part of the self-
identity of the European elite and its self-declared mission to ‘improve’, to ‘civilise’, ultimately to ‘modernise’ India. Paradoxically, such ‘improving’ strategies nurtured a corresponding denial, predicated on race and culture, of Indians’ right and ability to practice ‘real’ science or to assume a position of equality and authority within the institutional and intellectual arenas of colonial science.’ (212)

Recent scholarship has attempted to unearth these other vital sources of scientific knowledge which have been unabashedly swept under the carpet. Post World War I has seen an increase in the kind of scholarship that began to investigate the contributions of other civilisations to science. One of the most influential of such attempts is Joseph Needham’s twenty volumes expounding the role of China in the corpus of what is considered as ‘world science.’

Joseph Needham was a British scientist, historian and sinologist whose *Science and civilization in China* is significant for challenging the Eurocentric historiography of science. The book written over 1954-2008 comprises 27 volumes cataloguing the history of science in China and its impact on Western science. He gave the famous analogy of the contributions from different cultures and civilisations as the streams flowing towards the sea of world science. Science is not the prerogative of one country or epoch but a collective wisdom of civilisations and eras. Needham’s role is vital in exposing the Eurocentric stance in the historiography of science. Another example is that of Cornell Professor Martin Bernal’s *Black Athena: The Afroasiatic Roots of Classical Civilisation* (2001) which is a three volume work where he discusses the effect that Ancient Egyptians and Africans had on the Greek civilisation. Bernal’s central argument is that from 18th century onwards, western academia has systematically denied any such influence on the Greek civilisation. He especially indicts the 19th century scholars who have suppressed the many connections that the Greek civilization enjoyed with other cultures and instead have painted it as being purely Aryan.

Amitav Ghosh takes on this belief and is successful in hinting at Indian contribution in the annals of malaria research in *The Calcutta Chromosome*. He tries to highlight the existence of an Indian ‘school’ of science and weaves it with the story of Ronald Ross the scientist. He raises the issue of the existence of scientific
knowledge in the pre-colonial Indian setting, which was eventually decimated by the institutionalisation of western science. Apart from that, the contribution of scores of Indian laboratory and para-scientific staff in aiding the western science to flourish in alien soil is well depicted. Even though this mystery thriller gets into the questions regarding the identity of the key players getting more and more mired in a fog of mystery, Ghosh radically upturns the politics of science as the world knows it. He has emphasised Ross’ memoirs as one of the key sources in the writing of this novel. Fundamentally this novel is about a search – about Antar’s search for Murugan and in turn his search for Ross, finally it is the reader’s search for the elusive Indian science that has remained hidden in the ante-rooms and the alleys, becoming a menial helper to the proliferation of the big science, but itself remaining content in that subordinate position.

Ghosh shows Indian science as being miles ahead of its western counterpart, it has to however embrace silence if it has to survive. Here one can situate this understanding in what Shiv Vishwanathan calls as the ‘esoteric’ approach to science. According to this approach, linkages are made between mainstream science and esoteric, Gnostic and cabalistic groups. An attempt is then made to explore these subterranean connections. However, the conclusion that this study has reached in Ghosh’s portrayal of Indian science in this novel is somewhat janus-faced. While one can be appreciative of his research into Ross’ memoirs that led him into understanding the intricacies of the Indian strand in the contribution to Malaria research, it is also important that he chooses the genre of mystery thriller spanning continents to tell this tale- which is also understandable because the portrayal of a Gnostic group could not have been effectively achieved through a realistic mode. However his portrayal of these people is riddled with the very same orientalist prejudice- the imagery of blood, gore and cruelty- somewhat undoes this attempt. On the other hand, like the adolescent Anne Frank, who has to wait in the attic with bated breath lest she be found out by the Nazis to be exterminated, Ghosh chooses to show the existence of an Indian science and by using the genre of mystery thriller, has fed his readers with curiosity, interest and inquisitiveness about this field that has been lying unexplored for so long. Much like the dynamics of a scientific discovery itself, this book
pieces together evidence after evidence to give us a picture, which however he never completely shows, always withholding some details.

Similarly, Panikkar in the essay ‘Indigenous Medicine and Cultural Hegemony’ talks about the existence of established Ayurveda and Unani systems of medicine in India at the time of the colonial advance into India. He outlines the gradual decline of these systems with the simultaneous institutionalisation of the Western medicine. The triumph of the Anglicist view on the imparting of Education to Indians culminated with the passing of the Medical Act, which was ‘...not only geared to the implementation of a practice embodying Western knowledge but also directed at delegitimizing indigenous knowledge. He argues that with the introduction of Bombay Medical Registration Act of 1912, (later followed in letter and spirit by all Presidencies) it became mandatory for practitioners to be registered with the government to be considered lawful. Only those who were registered under the Act were eligible to issue medical certificates or be eligible for appointment to public offices. (Panikkar 149) The registration was open to ‘Doctors, Bachelor and Licentiate of Medicine, and Master, Bachelor and Licentiate of surgery of Universities of Bombay, Calcutta, Madras, Allahabad and Lahore and holders of a diploma or certificate from a government Medical College or school.’ (149)

By extension, it meant that only practitioners qualified exclusively under the Western system of medicine were now qualified to be registered as doctors by the state. The idea of disallowing them to practice itself was also proposed but the government turned it down as ‘impracticable at present’: however it was hoped that when time was ripe, a law would be introduced for ‘excluding unqualified practitioners.’ Panikkar says that: ‘The Act, by implication excluded the indigenous system from its operation and thus the patronage of state. More importantly, the practitioners were relegated to an inferior status, as they were unrecognised by the state and therefore deemed unqualified...The Act did not debar the practice of indigenous medicine but it did not have the approval of the state. The partisan attitude of the state was thus unambiguously articulated through the Act …to the protagonists of indigenous medicine the government policy of denying them unhampered space
was an act of cultural oppression and deprivation as knowledge and practice of medicine were viewed as part of their culture.’ (150).

Panikkar quotes from a Bengali novel Arogya Niketan (1953) written by Tarashankar Bandopadhayaya which talks of the decline of indigenous medicine with the coming of the British. Through the central protagonist Jeevan Moshai he delineates a poignant decline of a family run dispensary, Arogya Niketan. Inspite of his unmatched skills of diagnosis and prognosis, he is gradually marginalised by the western trained doctors. The dispensary that has looked after the medical needs of the village for three generations becomes dilapidated:

It (Argogya Nikatan) was established 80 years ago. Now it is in a state of ruin. The mud walls are broken here and there. The roof has several holes; its central part is hanging down- like the posterior of a hunchback. Yet the dispensary manages to exist- awaiting its end, expecting the moment when it would collapse. (Bandhopadhaya quoted by Panikkar 153)

According to Panikkar the state of the dispensary is symbolic of the state in which the indigenous medicine found itself with the advent of the western style education in India. One can surmise the declining condition of the native systems and their being driven into the nooks and crannies and their being forced into the anterooms of western laboratories like in The Calcutta Chromosome.

This study attempts to show the Western science as having a dialectical rather than unilateral relation with the colonies. Abandoning the presumption that the West brought science into the colonies, this study underscores the fact that India too had its culture of science and technology which was sidelined to entrench the western view as the only authentic one. Additionally, one looks at the state of western science at this time more critically- for western science the foray into colonies meant opening up of vast tracts of epistemological space. It offered new varieties of flora and fauna to enrich its disciplines that were in the process of being re-inscribed. And like discussed before, in another way, it offered scores of scientists, laboratory and allied staff without whom the march of science in colonies was not possible.
As Arnold explains: ‘Although the history of science, technology and medicine continues to be presented in general histories as record of western discovery and dissemination, it has become widely acknowledged … that not all such histories can be conflated into a single story of European achievement or saga of European enterprise overseas.’ (Arnold 211) Repeated borrowings from, and interactions with Indian science were also a factor in determining the content of Western science in India and informing its eclectic outlook. Indian agency was indispensable from the collection of botanical specimens and *materia medica* to surveying or running hospitals. None the less, there remained a sense in which, in imperial eyes, science belonged uniquely to the ruling race.’

Ghosh tries to question the claim of originality of western science in *The Calcutta Chromosome*. In the foregoing discussion about the portrayal of the circumstances in which the British scientist Ross discovers the vector for malaria, (these were partly drawn after Ross’ own memoirs), the whole question of the ‘real inventor’ being a complicated one is also underlined. Like Kuhn also argues that these are very tough questions to answer; even though he desists from a political explanation of the same. This idea is a valuable one especially if one is looking at the politics of historiography here:

As chroniclers of an incremental process, they discover that additional research makes it harder, not easier to answer questions like: when was oxygen discovered? Who first conceived of energy conservation? … simultane ously, these same historians confront the growing difficulties in distinguishing the scientific component of past observation and belief from what their predecessors had readily labelled “error” and “superstition.” (Kuhn 2)

As a consequence of the impact of western Science in India, science also became the ultimate touchstone for the many religious reformers of the Nineteen th Century. Science symbolised the route that led to modernity. It became the touchstone against which to test reform of Indian religion and the vices of superstition, blind belief that stunted its growth could be removed from its body like dead wood. In this could be achieved the revitalisation of Indian religions that were now seeing their low-point, being riddled with problems such as these. As far as the reaction to the
Western science within India was concerned, there was at one level, mimicry of the discourse of the coloniser by the western educated elite, to the extent that they undertook an exercise to trace the ills of Indian society, culture and religion to a lack of scientific rationality.

Most socio-religious reform movements and leaders, including Raja Ram Mohan Roy derided the superstitions and blind beliefs that had become a hallmark of Hinduism and sought to reveal the real face of Hinduism which in its original state was presented as rational and scientific. Many of these movements invoked reason to produce bitter critiques of ‘irrationality’ in Hindu religion... By the Nineteenth century such critiques acquired a different edge as scientific reason became the organizing metaphor in the discourse of the western-educated elite. (Prakash ‘Science’ 59-60) Colonial India was witness to the spread of Western science also very powerfully as a discourse of power. As discussed in the preceding chapters, science was projected by the colonizer as the proof of his superior reasoning and intelligence, thus in a way the right to rule over the native people was conceded to him. The Railways, telegraph and factories became the new shrines that evoked awe amongst the natives. Science could become a touchstone because it was considered to be beyond the manipulations of politics.

Apart from the optimistic belief in science evinced by the Social and Religious reformers in India there were other shades of opinion present in the country too that were less than welcoming to western Industrialisation. Gandhi, one of the most prominent political voices of the subcontinent too perceived Western science as inherently immoral. His view of science is more critical of the kind of modernity spawned in its wake. He surmised that the most crucial reason for India’s political slavery was fundamentally economic. In order for India to become free and more importantly, moral, it was imperative that it reject western industrialisation. In his treatise *Hind Swaraj* (1910) he makes a case for an alternate model of development that was in accordance with the need of the people rather than greed of the West. He denounced the model of Industrialisation that was highly centralised and instead recommended a village-based cottage industry model that would cater to the domestic need of each family adequately.
His espousal of *Khadi* as an alternative to the cloth from the mills of Manchester too had its basis in the ideal of embracing *swadeshi*, which would in turn lead to economic and political liberation. Gandhi had showcased some of these ideas from his days at the Tolstoy farm in South Africa. There is no doubt that his grounding in Romantic ideas of thinkers such as Rousseau and Thoreau was instrumental in his espousal of an ideology that was driven by an alternate worldview. He was romantic in his stark challenge to the ascending monuments of science and technology in which the West seemed to have posed an extraordinary faith as the deliverer of the times. There is no doubt that Western model of Imperialism utilised science in need for drawing more and more profits from its existing and expanding trade and Gandhi was denouncing this greed that had become integral to the whole definition of their commercial activity. He argued that India ought to establish its own definition of modernity if it was to have any relevance.

The Theosophical Society was another voice against the crass materiality of western science. The proponents of the organisation considered materialism of western science to be the cause of all inequality and evil in the world and the only option out was recourse to Ancient Indian wisdom lodged in the Ancient religious scriptures of the East. They adopted tools like meditation and hypnosis as means to a superior understanding of the natural phenomenon. (Prakash ‘Science’ 74)

This study can be a point of departure for attempts that can analyse other literary responses to the introduction of western science in India. Since at the heart of this study is an effort to expose the nexus between a broader ‘culture of knowledge’ to science and also the dialectics of this exchange, the complexity of thought movements and resulting ideological climate that produces scientific as well as political thought is explored. Thomas Kuhn’s theory of framing of paradigms by a given scientific community to be subsequently taken as the parameters along which the scientists engender new theorems has proved useful in understanding the subjectivity marked in scientific work. For this study the context to science has become central; the skewed power relations in a special situation like colonialism further sharpen the need to revisit the circumstances (late eighteenth century onwards) that have gone into the production, expansion and historiography of sciences. Therefore studying the literary
responses from India to science could be an exciting enterprise to undertake for a
student of literature as well as Cultural Studies.

A mention was earlier made about Panikkar’s discussion of Tarashankar
Bandhopadhayay’s Bengali novel *Arogya Niketan*, about the gradual decay of
Ayurveda in the villages of India with the introduction of western medicine and the
gradual outmoding of these indigenous forms with the introduction of the partisan
Medical Act. This is certainly a project waiting in the wings for any researcher
interested in exploring other such texts in English as well as regional languages
dealing with this area of enquiry.

Another area which is more literary can be an enquiry into the genre of science
fiction in India. Even though the only text amongst the ones chosen for the present
study that can be described as resembling science fiction is *The Calcutta
Chromosome*, it too, is a fairly reworked type. It does incorporate elements of
conventional science fiction, in that there is a portrayal of a possible technological
future where humans resemble cyborgs (Antar’s relation with his supercomputer
*Ava*); however it departs from the conventional science fiction in forging a relation
with the past and more so a revisiting of the socio-political circumstances of the past.
The novel explores the structures of power inherent in the institutions of western
science operating in India at this time and through it, the reaction of the subaltern
science to the entrenchment of western science in colonial period.

However as far as the present study is concerned, the central area of
investigation is not the genre of science fiction per se but the portrayal of science as a
cultural phenomenon. Western science, its personages and institutions were grafted
onto the landscape of India as a discourse of power and as analogous to the British
rule. Taking a cue from Nandy, this study concedes the fundamental assumption that
every society produces its own science and that science in a very fundamental way is
wrought out of human society’s interface with nature. And to use Needham’s imagery
of science of every culture as being a stream that contributes to the ‘sea of world
science’: this is the attitude that ought to inform our understanding of contribution of
different cultures and civilisations to science. For the West to appropriate science as
an exclusive production is a political act concomitant with Imperialism. It gave them
an authority to rule as a special class because their ‘better’ science meant reason and intelligence and all other qualities needed to reign in another culture. Needham’s attempts to revisit this tendency in European historiography and highlight the achievements of other civilisations in contributing to the present day shape of science is laudable and can be another trajectory along which contemporary research can direct its energies to temper this imbalance that we have seen operative in the history of sciences.

This study, interdisciplinary in nature has drawn from rich resources of Indian history, history of science, philosophy and literature. Since one is looking primarily at literary texts, and one’s metier being literature, it has been my endeavour to put Ghosh’s novels at the very heart of the discussion. It is also owing to some rather complex characters he has delineated that this study eventually assumed the present shape. One important characteristic of the genre of novel writing is that it has the magnitude to not only showcase but subsume the complexity of lived experience. The original impulse to stay close to the text in addition to Ghosh’s nuanced understanding of historical phenomenon allowed the present study to open up the available linear model of Post Colonial understanding. The complexity of the ‘cultures of knowledge’ that it has tried to capture in this study was in the first place responding to the writer’s portrayal of the phenomenon in the complexity that he does.

The study has located the science of Botany and how it was well within the parameters of responding to the idea of ‘nature’ in the first place. The centrality accorded to nature in the Romantic movement provided this study a further impetus in studying the romantic revolt as the first large scale reaction to the science and technology and its socio-cultural manifestations. It is also not far fetched to see it coming back as full ‘circle of reason’ two centuries later in the contemporary Environment movements. We certainly have moved from the divine and mystical meanings accorded to nature by the romantics but even in the classroom situations, the young minds do not take very long to understand Wordsworth’s impulse when he laments: ‘going and coming we lay waste our powers, nothing we see in nature that is ours.’
The Romantic Interregnum was a rather minority view of an alternative idea of western progress: in their worship of nature they offered a model of development that would place nature in the centre and not as the means to be unabashedly exploited in the name of material progress. The Victorian epoch with its sanguine reinstatement of progress as the ideal progressively moved further away from this understanding of nature. Exploitation of flora, fauna and natural resources became the new religion and the two chapters in this study take up this subject in great detail. The worship of nature gave way to identification of fauna for economic gains and later its refinement into processed goods (using science and technology) that bring profits that far outstrip the trade of raw plants alone.

Further the chapter dealing with the introduction of western science in India outlines other concerns about science emanating out of Ghosh’s fiction. It looks at the state of subaltern science as a phenomenon in the colonial times as it is portrayed in The Calcutta Chromosome and also later the politics of Eurocentric conception of science through his debut novel, The Circle of Reason. The study then moves to some of the present day concerns too through his novel The Hungry Tide, which in some ways makes a case for recognition of various knowledge systems and is also utopian in its espousal of arriving at a synthesis for an enhanced understanding of nature. The book also in some ways looks at harmonious coexistence of not only man and man but also man and beast. By situating the story in the hostile terrains of the Sundarbans, Ghosh has brought back the might of ‘nature’ to centre stage at a time when technology seems to be so saturating us with its intrusive presence that it is no longer far fetched to describe our identity as inching towards the cyborg. However, an occasional tsunami awakes us to the power out there which for all of man’s arrogance has a way of asserting itself with full force every now and then. Science has attempted to understand this power and then applied that knowledge in this quest to harness it for his gains and profitability. He first does it to nature and then goes, around, in an imperial way, inflicting it on other people whom he has outmoded in his application of instrumentalist knowledge.

Ghosh’s novels have definitely shown us the way but one hopes for a novel that will show, albeit in a more realistic way, the operations of an Indian science prior
to the entrenchment of western science in India. That too is the chief difference between the metier of literature and social science and therefore it could be an unfair demand to make of an author. While one can outline a future course of desirable research in the near future, and also to some extent in literary criticism, one cannot foresee and ideally one should not, the possibility of certain phenomenon to be addressed through literature. Doing it is abominable enough and if at all, it transpires in the real work, literature becomes a game that is all too predictable which is sure to assist in its downfall. Literature, most of all ought to spring out of lived and felt experience of the author, if it starts responding too often to the tirades of the critics it will run the danger of converting into mediocre harangue with its design all too predictable. That surely would sound the death knell of spontaneity and unpredictability, the two important characteristics of fine literature.
End Notes:


3. Jonathan Bate, British academic and critic has worked in the area of ecocriticism especially with regard to the Romantic Movement. Other titles in this area include *Romantic Ecology: Wordsworth and the Environment Tradition.* (1991)

4. Prince Albert, the husband of Queen Victoria participated very enthusiastically in the Crystal Palace Exhibition. He is said to have encouraged Queen Victoria to appreciate matters of science. Electric telegraph was used to announce the birth of Victoria’s second son, Alfred Earnest. (Gorman xvi) In this regard Ping says: ‘Queen Victoria’s marriage to the earnest young German prince, Albert of Saxe-Coburg-Gotha helped to establish the modern role of the British monarchy. Victoria and Albert quickly grasped the significance of the monarchy’s new functions, which combined a small amount of political manipulation with an unlimited responsibility as the emotional and ceremonial focus of a people in social turmoil. It was Albert whose growing domination over his wife forced Victoria to take an interest in matters that had previously bored her, such as science and literature and even industrial progress.’ (Ping 1)

5. Ping describes the organisation of The Crystal Exhibition thus- ‘A Royal commission of architects and engineers was appointed to plan the building and exhibits. Out of 234 plans submitted, the commission, urged by the prince, eventually picked the most original design of all, a massive greenhouse designed by the head gardener of a northern duke. Joseph Paxton, however, was no mere gardener, but an engineer, railroad director, newspaper promoter, and imaginative architect. He offered
a building 1,848 feet long, 308 feet broad, and 66 feet high, tall enough to cover the old elm trees already occupying the chosen site in Hyde Park. It was composed of mass produced and standardized parts, including over 6,000 15foot columns and over one million square feet of glass.’ (1-2) What is particularly notable is not only the scale of the exhibition- the building of grand structures was indicative of the optimism Victorian times exuded about the idea of progress. More interestingly, the design of the building with its unusually big specifications was ‘tall enough to cover the old elm trees already occupying the chosen site in Hyde Park’ (Ping 2) – is also symbolic of the optimism the Victorians felt with regard to the ascendance of science over nature.

6. Interestingly, Ghosh talks about this evangelical tone in Victorian times where excessive religiosity was perhaps a way of dealing with being stripped of religion and God in the first place owing to Darwin’s thesis. It could be a defence mechanism to give a sacred brush to the immorality inherent in the colonial exploits. Ghosh talks about this evangelical impulse in explaining the horrors of opium wars too in an interview with Angiola Codacci of L’Espresso Magazine. Ghosh says- ‘As for similarities between past and present there were clear parallelisms between the Iraq war and the Opium War, most of all in the discourses that surround them. There is all this evangelical stuff, this assumed piety: ‘we are doing good for the world’. But beneath that there is the most horrific violence, the most horrific avarice and greed. I was writing the novel at a time when this kind of capitalist ideology was absolutely in its ascendant, where it was thought that the market was God. Within this context, it just baffled me that people could not see that for Free Traders, the first major testing ground was opium. All of that has been erased from memory. “The then-English governor of Hong Kong said: ‘Jesus Christ is free trade and free trade is Jesus Christ.’” Tim Teeman. The Times. 11 June 2011.

7. According to an entry in Wikipedia, ‘Dwarfs standing on the shoulders of giants’ (nanos gigantum humeris insidentes) is a ‘Western metaphor with a contemporary interpretation meaning: One who develops future intellectual pursuits by understanding an building on the research and works created by notable thinkers of the past.’ Its most familiar expression is found in the letters of Issac Newton: ‘If I have seen further it is by standing on the shoulders of giants.’
8. The novel was awarded the Arthur C. Clarke award for best science fiction in the year 1996. In a short piece “Arthur C Clarke” about the experience of meeting Clarke in Colombo, he reminisces about his own appetite for science fiction: ‘There was a time in my life when I was a glutton for science fiction. I remember, as a child devouring Edgar Rice Burrough’s interplanetary novels. But my appetite for the genre was sustained I think largely by the ethos of my birthplace, Kolkata, which has a passionate, if curiously ambiguous relationship with sciences. One of the city’s greatest offspring, Satyajit Ray had a lifelong interest in science fiction and I like to believe that my own interest derived partly from his stories.’ If one looks at the portrayal of Calcutta in *The Calcutta Chromosome*, it is as much an ode to the city as to Indian science. The article is available on www.amitavghosh.com.

9. Ghosh says the following in this regard in an interview with John Hawley: ‘For the last many years I have generally avoided reading reviews, theses and critical articles about my work. There’s often a temptation to enter into a dialogue with your critics and as I see it, there can be nothing productive in this for a novelist.’ (Hawley 13). However his empathy for researchers is evident in his extensive facilitative role. His website, besides being a comprehensive resource for research, also houses citation friendly materials and a detailed bibliography compiled by Claire Chambers. He clearly goes an extra mile in providing assistance to researchers working on his texts.