Chapter 1

Science, Technology and Empire in Amitav Ghosh’s Selected Works:
Exposition of The Argument

Conventionally science is seen as being sealed off from social circumstances. It is one arena which has been considered neutral and apolitical to the extent that the truth of science is considered inviolable over space and time. As a matter of fact, one can go to the extent of claiming that it is this very transcendence of socio-cultural factors that has accorded a unique place to science among disciplines. Science seems to emerge in the daylight through reportings in journals and esoteric papers. It is perceived to be undertaking a silent onward march towards progress and even though the lay people are at large foreign to its language and idiom, it has the potential of a hidden troll which periodically emerges from the cave (laboratory) and redefines the way we live or know our lives. It is revelation of a new insight that somewhat rearranges our understanding of life. However, science has meant power because not only has it made a long litany of phenomenon from unknowable to knowable but has also changed the way societies conduct themselves and their affairs. Social factors that impact the development, growth, spread as well as perception of the scientific phenomenon together constitute a fascinating area of study.

Recent scholarship has focussed on the sociological aspect of science and as Arnold says, has now begun to analyse science ‘less in terms of its self declared aims and putatively objective interrogation of nature and more in terms of its internal ordering, social construction and cultural authority...it has become clear that science is a highly social activity, one that cannot be sealed off from the values of the society in which it is practiced.’ (Arnold 1) To further situate science in the matrix of the colonial milieu with its skewed power relations is to embark on an exciting journey to unravel the dynamics of science and its intersection with socio-cultural, economic and philosophical underpinnings of the age.

Amitav Ghosh (b.1956) is very alive to these issues and his corpus shows a fairly detailed understanding of the historical processes. This study is conceived in response to his extensive engagement with science as a phenomenon in colonial India.
Even in terms of delineating a theoretical framework in which to study his various works touching on the broad thematics of knowledge and power and specifically on science and colonialism, the study owes a debt to the author. It is in response to his distinct vision that an attempt has been made to revisit Romanticism as a cultural and intellectual environment in which science of the period grew with a distinctive ideological influence. The study then analyses the Victorian era with its interest in Empire as an important source of influence on all areas of knowledge including science. Subsequently the study moves into the area of colonial politics – the entrenchment of western science in colonies wherein science was presented as a discourse of power. The Romantic view of science as an empathetic observation of nature undergoes changes to emerge in the Victorian times as a means to unabashedly exploit natural resources in the larger context of Colonialism. This theoretical trajectory is constructed in response to the presentation of science and scientific personages in Ghosh’s novels and his constant endeavour to present to the readers a more nuanced view of history and history of knowledge construction than what a straightjacket theoretical framework can capture.

While it is true that the methodology of science encourages its provability across time and space, it is also true that the larger context in which science operates is dependent upon the socio-economic factors. The use of science as a discourse of power to legitimize the foundation of Empire was primarily based on the credibility of science as a discipline. Infact as Gyan Prakash points out: ‘... it is owing to these salient characteristics that, science, in the colonial context was infused with a cultural authority as legitimizing sign of rationality and progress.’ (7) He further makes a very significant point in observing that science is rooted in its ambiguity as a multivalent sign- ‘... in its ability to spill beyond its definition as a body of methods, science traversed a vast arena: encompassing fields from literature to religion, economics to philosophy.’ (Prakash 7) Science was appropriated by the West in its sanguine regard for the idea of progress in the hey day of colonialism. An organized challenge to this tendency in European historiography came in the years post World War II. Starting from the work of Joseph Needham onwards, who proved the importance of Chinese system of science and the unacknowledged debt the modern European science owed to it, others like Martin Bernal in his book Black Athena (2001) argued for the Afro-Asiatic roots of the Greek civilisation which is considered the bedrock of the modern
Western civilisation. The Western historiography presented science as an unproblematic continuum of discovery after discovery emanating from the West. The present study takes as a point of departure the fact that West has used science in the service of the ideological need to consolidate and justify dominance during the spread of colonialism. Apart from the tangible use of science in the form of superior navigational skills, improved artillery and empirical quantificational tools, science in the context of colonialism has also been used as a form of power discourse to display the superiority of the West.

Another concern central to this investigation is the unfolding of the argument that the discipline of science, particularly what was then referred to as Natural Philosophy evolved into the form we know today because of its interaction with the colonial expansion. In this study an attempt is made to situate science both as a phenomenon and practice emanating out of the ‘cultures of knowledge’ prevalent in Europe at this time and at the same time the dialectical give and take of metropolis and colony in determining this ‘culture of knowledge’. This study uses the concept of ‘culture of knowledge’ as a construct to understand the milieu (especially the institutions and philosophical trends) in which science was being created, both as a discipline as well as practice.

The study takes a detailed look at the Romantic Revolution as this ‘culture of knowledge’ in spawning a distinctive approach to science. It needs to be iterated especially for the purposes of the present study that Romantic Revolt was a reaction against the sordid and ugly after effects of the Industrial Revolution. It is important to revisit this phase of British history also because it is an important reaction to the ‘social impact’ of science. The large scale industrialisation had not only redefined means of production, consumption and overseas trade patterns but also the social equations. Large scale exodus of rural population to the industrial centres led to destitution, poverty and squalor. The excesses committed on child and women labour and their poor living conditions are well documented in the literature of these times. One important refrain of the Romantic poets and thinkers was their insistence on according a central place to nature. Romantic interregnum can really be seen as a pause between the two phases of industrialisation – the Industrial Revolution and the Victorian times - it was a meaningful pause to reconsider the damage the Revolution had incurred on the fabric of society and nature and call for a more balanced science
that would broach nature with piety and not plunder it for material gains alone. In some ways, this study sees the Romantic interregnum as the one possibility afforded by history to science to acquire an alternate path.

However, the growth of overseas dominions continued and reached an all time high for Europe by this time. By the 1830s the Victorian spirit of progress became a much celebrated idea and began to have an influence on all aspects of life, including science and technology. Industrialisation and mechanisation were seen as man’s triumphant ascendency over nature and its resources. In *The Peach Grower’s Almanac* (2008), a recent novel by Elaine di Rollo, Mr Talbot, a ‘gentleman’ with an eclectic collection of antiquities and artifacts tells his two daughters:

It was, he declared at the outset, to be a collection that embodied and quantified progress: one that demonstrated the triumph of human ingenuity over nature and history. (4)

This is your heritage... your past, present and future. This family made its fortune in industry and engineering. Clearly, it is to human ingenuity and its legitimate offspring -progress-that we owe our wealth, our success and current situation in life. (5)

The Victorians showed a sanguine regard for the idea of progress and it also became, to borrow Conrad’s phrase, the one redeeming idea for the enterprise of colonialism. The ascendancy of colonialism crisscrossed with the growth of science as a discipline in intriguing ways. The discussion in this study shows that Colonialism shaped science in the mould of Utilitarian ethics. From the Romantic ideal of nature study to ‘reveal the bounty of God’ it became an instrument of exploitation for the colonist seized with the utilitarian ethic.

In this proliferation of science in the colonies, the ‘use’ of Indian workforce for the benefit of western science is also a lesser known narrative. To begin with, ‘Indians were seen as wholly incapable of any original scientific research and later, when few like Prafulla Chandra Ray and others, even upon acquiring a Western style education were denied entry into these services or were treated with contempt and when taken, like Jagadis Chandra Bose were offered one third the pay of his British Colleagues.’ (Arnold 140). It is in this context that one has to look at a text like *The
Calcutta Chromosome (1996) wherein the British scientists hold central and important positions in running the laboratories and the Indians are no better than menial workers. At one point the scientist Cunningham says that he employs the workers who offer themselves for these services -`far preferable, in my opinion to being surrounded by over eager and half formed college students. One is spared the task of imparting much that is useless and unnecessary.’ (Ghosh 127. Italics mine).

Related with this is the assumption that the growth of science in these times must have corrected the inherent prejudices against other races. The situation was quite the opposite: with the publication of Charles Darwin’s The Origin of Species (1859), the dictum of ‘survival of the fittest’ began to rule several areas including race. The competitive spirit of the animal world was transferred to human socio-economic sphere where the only way forward for a race was a ruthlessly competitive approach which was no different from the way evolution plays out as a ruthless game of the jungles. Paradoxically, the rise of science did not in any way lead to better understanding of race as an idea. Infact science was used to perpetrate the myths about race in a ‘scientific way’ such that they became all the more difficult to refute.

Phrenology developed as a science in these times and was used to measure skulls against the standard dimensions of the skull size of the white man. Amitav Ghosh, by making Balaram in the The Circle of Reason, (1986), a feisty practitioner of Phrenology achieves the criticism of wholesale import of western science into India with rather ironic undertones. The Indian middle class, on being educated in the mould of the westerner was all set to perpetrate identical instruments of abuse on their fellowmen. Phrenology becomes a classic example of this practice. The blind, mimetic acceptance of Western knowledge becomes their undoing- Balaram’s utopia is consumed in a destructive conflagration. Similarly, Nandy expounds that every culture produces its own science, it is for every culture to nurture that. Further, synthesis of knowledge is ideal but wholesale mimicry of knowledge can only be disastrous. (Nandy Alternate Sciences 17) Mr Talbot in The Peach Grower’s Almanac echoes this idea:

Progress can only be understood with reference to the past. We are giants, but in turn we stand on the shoulders of giants. I am paraphrasing Newton, of course, one of England’s greatest thinkers.
While Mr Talbot and Newton did give some credit to the amorphous giants of the past for all the progress they made, in their imagination the giants were all white.

The many binaries used by Edward Said in *Culture and Imperialism* (1994) to describe the unequal relationship between West and East can be extended to this sphere where the former was seen as scientific and the latter as unscientific and by extension, superstitious, backward and in dire need of amelioration by the ‘benevolent’ West. In a sense this argument which reverberates in the many important voices of those times fulfills an important function of the very justification of empire building in the first place. Said, when he asks the important question as to why there were few dissenting voices from within the English society against colonialism, explains it through the absolute power that arguments such as these held sway over them. They believed in utmost earnestness that apart from making money, the English were in the colonies to ‘reform’ and bring science and progress to the backward people of the new worlds. (120-21) Science thus became a part of what Said refers to as that cultural space in which imperial power was represented and explained *inter alia* through science. He further elaborates that natives accept colonial rule so long it is the ‘right kind’. The West saw itself in a befitting role to extend patronage to the rest of the world owing to the rapid strides it was making in science. Echoing this buoyant attitude towards science, Ruskin says:

> Within the last few years we have had laws of natural science opened up to us with a rapidity which has been blinding by its brightness and means of transit and communication… (Quoted by Said 123)

Historically, according to Said, this is how imperial rule made itself palatable. The introduction of Western science both as a subject and an indicator of modernity during these times is also a phenomenon worth exploring. There was stark incongruity between science’s ‘image as free inquiry and its use as an instrument of colonial domination.’ (180) Said, in the exhaustive discussion of Rudyard Kipling’s *Kim* in the book has shown Col Creighton as a character in whom the interchange between ethnography and colonial work is fluent. Kipling, according to Said is one of the first novelists to portray ‘this logical alliance between Western science and political power at work in the colonies.’ (184) He says that the contribution of empire to the arts of observation, description, disciplinary formation and theoretical discourse has been
ignored- an attempt is made to do the same in this study. The colonial period which is under purview of the present study, it is argued was a time of great strides in Western science and technology and it colluded with the colonial powers to become what James Headrick refers to as the ‘Tools of the Empire.’ This along with the discursive hold it had on the perpetrators as well as the colonized in the imperial process makes it a daunting phenomenon unfolding in the colonial times. It is this aspect along with the very appropriation of science by the West, the discriminatory relationship between the colony and the metropolis as within the Western and Indian scientists and science that is of interest to this study.

The study takes a closer look at the many layered consequences of the transfer of western science to India. To begin with, the use of empirical parameters in laying a grid over the ‘unwieldy’ mass of India in order to make it intelligible to the new rulers. When the British came to India they initiated large scale surveys. A survey in those times had a much more comprehensive connotation- it included a rigorous documentation of all the aspects of a nation- socio-cultural, anthropological, linguistic and scientific. (Vicziany 653) These detailed documents became the numerical and factual storehouse of all information deemed important by the new rulers of India for its governance. These were used as baseline figures for all the decisions taken by the British functionaries. Cohn (7) elaborates on this aspect of colonial rule and says that for the British these numbers signified a source of comfort in the otherwise chaotic reality of a gargantuan state like India. To be able to reduce the socio-cultural and economic complexities of India to numbers was very helpful for the administrators but these were often skewed representations of the phenomenon tailored to suit the interests of the ruling class.

Scientific surveys too were a part of the same Victorian spirit that had a sanguine optimism towards the cataloguing of the flora and fauna. The colonies offered vast, unexplored territories housing thousands of exotic species of plants and animals that could become fodder for their encyclopedic quest for knowledge. The amateur scholar is the face of this entrepreneurial spirit and it was this spirit that drove science into hitherto unexplored frontiers. Scores of Army and Civil officers, doctors of the Indian Medical Service, engineers and geologists were also part-time researchers given to a dedicated interest which they pursued relentlessly. Science was also the new frontier to be conquered, the inventions and discoveries to be
II

Ashis Nandy’s opening remarks in his essay ‘The World of Jagadis Chandra Bose’ are worth reproducing here:

…the mystique of science as control and power, created primarily by the Industrial Revolution but also by the certitudes that the doctrines of empiricism and positivism have sired, attaches now also to the content of scientific knowledge. In the name of the autonomy of science, this mystique has encouraged many to assume science to be a distinctive set of ideas, free from cultural and psychological compulsions operating in other spheres of life...there is a widespread tendency among the ruling elites of Asia and Africa to forget that every culture produces its own science as surely as each scientific achievement produces new cultural realities.’

(Nandy Alternate Sciences 17)

This study takes this as the premise for investigating the correlation of Science and the ascendance of Imperialism in India as a phenomenon especially as it plays out through the works of Amitav Ghosh. It also makes an attempt to understand the dynamics of the larger ‘culture of knowledge’ in the metropolis (first Romanticism and then Utilitarian ethic of the Victorian times) as the matrix that sired the science of these times.

In an attempt to understand the genealogy of the ideology of science that Ghosh displays through some of his novels (especially the two titles of the proposed Ibis trilogy), this study takes into account the fact that the Romantic epoch in British history provided a context both for the critique of mechanistic science that made itself manifest through the Industrial revolution as well as the flowering of a more ‘ecological’ science (the focus of this study is more on Botany). With the coming of the Victorian times, however, the ascending Imperial power together with the venerated idea of progress overtook the spirit of Romanticism and brought in its stead a cut throat utilitarian approach to science. The rationale of reverting to this time in late eighteenth and through most of nineteenth century is primarily done to facilitate an understanding of the various other ideological strands in the evolution of western
science as a phenomenon. Additionally, since this time coincides so powerfully with the consolidation of colonialism, this exercise helps us understand the dynamics of this exchange between Imperial policy and science. One is resorting to, what Shiv Vishwanathan refers to, as both the externalist as well as the internalist critique of science as one in not only groping with the larger ‘culture of knowledge’ that helped in the creation of science in the said period but also looking at the internalist philosophy that situates nature in a particular frame of reference.

The study engages with the issue of institutionalization, growth and spread of Western science in India, a territory that Ghosh shows tremendous accomplishment in mapping out before the readers through his novels. As discussed earlier with reference to Said, that in being presented to the world, science is also a discourse of power. When science as a discourse of power is juxtaposed with the historical advance of colonialism, it adds a new dimension to the phenomenon. One of the ways in which colonialism justified itself was to project itself as a medium of dispensing a superior civilization ethos to the ‘less civilized’ or ‘the savage.’ The argument I make here is that in a certain way, science became a part and parcel of what Said refers to as ‘culture’ in his book *Culture and Imperialism*.

While at one level, Western science represented a very real qualitative change it was capable of making in the lives of the colonised people, at another level the discourse of western science emanating from a stronger economic and political quarter, became a means of the *noble* civilizing mission in the colonies. Such was the power of science which the West appropriated for itself that eventually most religious reform movements that sprung up in the Nineteenth Century India were extensively drawing from the discourse of rationality and science and the thrust of the Indian reformers was, for the most part an attempt to prove the existence of a scientific, monistic rational Hinduism that had existed before it got corrupted into a decadent superstitious and superficial religiosity. Through this is mirrored the power of western scientific discourse that was assuming an unqualified superiority and was in turn affecting the tone and tenor of Indian reform as well. Science was the bedrock of this claim to superiority: it was perceived as the crystallization of superior reason and thinking acumen of the white man. And since science was a proof in itself, and an entity that was not implicated in subjectivity, the argument of its superiority could hardly be refuted. The white man’s presence in the colonies was premised on the
argument of absence of science and by extension- reason, intelligence and logic in the colonies. As Deepak Kumar reasons: ‘This state claimed superiority in terms of knowledge and inter alia helped the colonial state dismiss ‘other’ epistemologies. Both needed each other and became mutually dependent.’ (15)

As far as the advance of western style science to the colonial India was concerned, the British viewed India and Indians as people without science. David Arnold labels the British attitude towards Indian science as ‘Orientalist’. While India was seen to possess high degrees of scientific acumen as an ancient civilisation, it was said to be stripped off science in the Medieval times. According to him, this ‘school’ has believed in the existence of an advanced Indian science in the ancient times followed by its total decay and degeneration during the Mughal era. This ‘present’ state in which India found itself could only be redeemed with the introduction of modern science and technology. It is with the dominant Orientalist mindset that we see the immediate ‘appropriation’ of the ownership of science by the British and the simultaneous negation of anything close to science being practiced in India.

As a concession, Indian science was said to belong to a bygone era, however, it had no chance of asserting itself in the ‘present’ times of scientific decay perpetrated by centuries of Mughal Rule. Within this argument lay the very crux of the justification of British Rule, which was about to use ‘modern’ science and technology to ‘better the lot of the Indians.’ The adoption of an Orientalist stance suited the British well: it gave them the one potent reason for the justification of the Empire itself. The British science was particularly in a very aggressive and expansive mode at this time in history. It came to Indian shores with the scaffoldings of the firm institutional, administrative and ideological support. Scores of organizations-botanical, statistical, geological, linguistic, botanical, zoological etc came up to streamline the work in these areas and to provide a base to the colonial scientists working in these areas. This was also the time, the disciplinary demarcations in science became more pronounced as compared to the earlier amorphous state.

The contemporary revisionist historians believe that in the true Orientalist spirit medieval India was not given credit for several scientific and technological practices flourishing in Indian society at that time. Arnold avers that India at this time, ‘far from existing in cultural and technological isolation and being averse to all
innovation, had over the centuries borrowed extensively from and contributed generously to the scientific and technical knowledge of neighboring regions, from the Middle East and Central Asia to China and Southeast Asia, and in fields as diverse as astronomy, chemistry, cotton production and processing etc.’ (Arnold 4-5) Similarly, the case of Indian shipbuilding is discussed in great detail later in context of the Ibis trilogy where the destruction of the Indian shipbuilding is highlighted with regard to Bahram Modi the Parsi businessman.

The Mughals were patrons of science and technology in the pre-colonial era. Others like Raja Jai Singh of Jaipur exhibited a curiosity to incorporate current western trends in astronomy - and between 1722 and 1739 got observatories built at Jaipur, Delhi, Mathura, Ujjain and Benaras. Serfoji, the last Maratha ruler of Tanjore took initiative in building a library of Indian and Western medical texts. Delhi remained a seat of learning and science up until 1857 revolt and witnessed a ‘twilight renaissance.’ (Arnold 6) Similarly, the Indian medicine suffered at the hands of the British science as the former were neither organized nor strong enough to take on the offensive. The excessive standardization which the West was aiming at in all areas in this case turned out to be a ploy to keep the ‘alternative schools’ out of the ambit of standard, acceptable, conventional.

This brings to fore the very forceful Foucauldian notion of ‘the struggle between knowledges’ which is a very valuable idea for the present discussion. Critics such as Gauri Viswanathan have used this idea to contextualise the rise of English literary studies in India during colonialism. This study is an attempt to understand similar questions Ghosh asks through his fiction about the rise of Western science at the cost of Indian traditions of science. Michel Foucault in his essay ‘Society must be defended’ talks about this tendency of the coloniser and goes back as a true ‘historian of the systems of ideas’ to the time of Enlightenment and consequent colonization. He contends that this time (18th century) was the time of competition amongst knowledges. (178) Just like historians and Cultural Studies practitioners have established the story of introduction of English Literary studies in India and the very first class of Shakespeare at the Presidency College, Calcutta, similarly with the passage of Macaulay’s bill not only was English made the medium of instruction, but other disciplines and bodies of knowledge as had existed in the Indian system of Education before the advent of the British were blatantly sidelined. What Macaulay
achieved with the introduction of English medium education in India was by no means an isolated event in the history of Education reform in India. It was instead a link which becomes very clear when we try to understand the Imperial politics vis-à-vis knowledge at this time. As mentioned before, Foucault in his essay ‘Society must be Defended’ has focussed on this time (when colonial expansion was getting more aggressive) in 18th century, simultaneously there was a political attempt to ‘manage’ knowledge:

At this time we saw the development of processes that allowed bigger, more general, or more industrialized knowledges, or knowledges that circulated more easily, to annex, confiscate, and take over smaller, more particular, more local, more artisanal knowledges. There was a sort of immense economic-political struggle around or over these knowledges, their dispersal, or their heterogeneity, an immense struggle over the economic inductions and power effects that were bound up with the exclusive ownership of a knowledge, its dispersal and secret. What has been called the development of technological knowledge in the Eighteenth century has to be thought of in terms of a form of multiplicity, and not in terms of the triumph of light over darkness or of knowledge over ignorance.

(Foucault, 179-80)

Foucault, in this work also talks about the effect of rigid disciplining on knowledge. He argues as to how with the setting up of Universities and with the writing of Encyclopedias one form of knowledge becomes ‘authentic’, thereby eliminating others by an act of exclusion. By legitimizing theirs and keeping others outside the fold of what constituted acceptable, the West was successful in promoting one kind of knowledge and marginalizing others. He also shows how post nineteenth century, as a consequence of the establishment of this kind of hierarchy, the ‘amateur’ scholar ceased to exist. (183)

The widely held belief of European preeminence in the sciences becomes a point of departure for this fundamental argument that colonialism meant the transference of a scientific ethos which the colonies were said to lack. However, if we were to revisit the growth of science as a discipline in Europe at this time it not only strengthens our position to evaluate the coming of science to India but also gives us a
more realistic picture of the level of scientific advancement Europe enjoyed at this time. Such an endeavour also places science in a dialectical rather than unilateral exchange with the colonial methods and means which is the very basis of this argument. The introduction of western science in the colonies was not a unidirectional, monolithic process but one fraught with complexities - the growth of western science at this time can be seen as a consequence of its spread to the colonies - this encounter was to change the methods, means, epistemological and ontological space of western science. From a phenomenon that was being influenced by the many worldviews present during colonial expansion, it was eventually overtaken by the compulsive force of Empire, as were all other areas of existence.

This study explores the relationship of science and technology to the enterprise of colonialism and further the delineation of this complex exchange in the works of Amitav Ghosh. Ghosh, with his pedagogical training as an Anthropologist has wrestled with some of the debates current in the ascendency of some disciplines of Sciences and Social sciences during the time of colonialism. In the recent times a revisionary stance has made itself evident in evaluating the excessive Eurocentric approach of these disciplines. Ghosh, being entrenched in research and academics and his ideological conviction with groups like Subaltern Studies initiative, has given him the edge to weave some of these concerns in his novels. Ghosh’s strength as a novelist has been in unearthing some of the subterranean relations that have linked cultures and civilizations, in the same vein an attempt is made through this study to broach his novels where he not only questions the veracity of the Eurocentric claims to science but also goes back in time to expose the other available orientations to science.

Although Postcolonialism as a trend has been very influential in literary studies, scant attention has been paid to the aspect of science abetting colonialism. The issue of science has been very peripheral in the body of Indian Writing in English even though owing to its origin, the afore-mentioned larger questions of modernity, progress, rationality etc has been a part of the discourse since its inception. Ghosh has shown a keen insight towards issues of knowledge and disciplines. In most of his books there is the presence of a character who embodies a certain knowledge system and in a self-reflexive manner talks about disciplines and additionally gives an opportunity to the author to critique the discipline through the multitude of voices.
peopling the space of the novel. As an example, Tridib, in *The Shadow Lines* (1988) is the archeologist historian who gives the young narrator ‘lessons’ in the use of imagination. He presents the young narrator with a Bartholomew’s Atlas as a childhood gift which remains a symbol of this transference and surfaces years later in the narrator’s hostel room in Delhi—thus signifying a lasting influence that Tridib has had on the narrator and the uncle’s symbolic gift of the ‘worlds to travel in and the eyes to see them with.’ As the novel opens, he holds a lot of promise for the reader as well as for the impressionable eight year old narrator. He is the eccentric uncle, the veritable knowledge bank with a deeper understanding and the one who passes on his love of knowledge and books to the narrator. According to Meenakshi Mukherjee, Ghosh in this aspect shows the influence of Bengali literature and lore where one finds literary and cinematic characterisations such as the distant uncle in Satyajit Ray’s film *Agantuk* or as she elaborates ‘…traveller/imaginist reminding the Bengali reader occasionally of the Ghana-da stories by Premadan Mitra and Pheluda stories by Satyajeet Ray in both of which a boy is held spell bound by a somewhat older person’s encyclopedic knowledge of other lands and civilisations.’ (*Maps and Mirrors* 255-56) Tridib gives to the narrator his most important lesson in gathering and organizing knowledge. He is a figure that the reader holds in much promise but gradually his life remains no more than a series of impotent acts.

Similarly, Balaram, in *The Circle of Reason* (1986) for all his shortcomings is a genuinely knowledgeable man even though it is this very knowledge that becomes a trap for him. In *The Hungry Tide* (2004), Piyali Roy is an accomplished cetologist who has come to the Sundarbans to study whales. Similarly among other examples in, *In An Antique Land* (1993), the narrator is the author himself working on a PhD. The two titles of the Ibis trilogy sees the focus on Pierre Lambert, the Botanist who embodies a very different ideal of knowledge from the one held by the Utilitarian scientists of the Nineteenth Century. This keenness to explore the dynamics and politics of scientific knowledge has prompted Ghosh to ask some contentious questions in these works.

One of the key attributes of Postcolonialism as a theoretical framework and also as an attitude has been its reevaluation of disciplinary domains. Since it is also an area which takes into account, the assumption that knowledge and power are
interrelated in deeper ways than we acknowledge, it casts a skeptical look at the seemingly natural progression of disciplines. History as a discipline has really found itself in the thick of this maelstrom and has undergone a process of reevaluation where now we have come to the understanding that the writing of history is neither innocent nor only scholarly- it is an activity that is highly political and marked by a complicated power play of forces which is beyond our quotidian understanding. Ghosh has exposed this contentious side to history through novels such as *The Shadow Lines*. Through this work he has reassessed the Partition of Bengal through the voice of its victims, the book also calls into question the credulity of the masses in blindly accepting history written by the powers from their vantage point. ’If you believe anything people tell you, you deserve to be told anything at all’ Tridib tells the crowd gathered at the *adda*, in itself a statement about the need to develop suspicion about the versions of history that are pushed down our throats and also hints at the hidden manifesto of Ghosh’s own writing. Through family stories, anecdotes and jokes, he exposes the cost of Partition and the sordid underbelly of celebratory Nationalist accounts of history.

His *In An Antique Land* (1993) was based on his experiences of his stay in Lataifa, a small village in Egypt while he was working on his PhD. Clifford James hailed the book as breaking new ground in anthropology because it calls into question some of the basic assumptions that western anthropologists work with while out on the field. (Chambers *Conversations* 29) The field work was geared towards his PhD but there was a very limited and prescriptive content he could put into his dissertation, the rest, which was equally important, took the shape of this book. Ghosh admits that the book essentially is a result of the many layered and complex experiences he had with the Egyptian people and also his constant desire to break free of the rigid ‘empirical’ parameters he had to adhere to as a researcher. Ghosh’s deep and long association with the Subaltern Studies initiative too has given a revisionary stance to his writings.

Similarly, *The Glass Palace* (2000) reconstructs the history of the colonial conquest of Burma, the capture of the King Thebew and his family and their subsequent exile in Ratnagiri (Maharashtra), India. It traces the story through the eyes of Rajkumar, an orphaned Indian boy who works in Burma and sees the view from a
little shanty tea shop opposite the grand palace. This perspective is extremely important as it is one of the subaltern, a perspective he wishes to foreground.

One occasion more than one, he has expressed the absolute need of revisiting the relations India has enjoyed since Ancient times with the Eastern countries. He has criticised the tendency of Post-colonial criticism to overlook all other connections between nations and cultures and concentrate only on the East-West encounter. (see Vijay Kumar, T. ‘“Postcolonial” describes you as a negative.’ *Interventions*, 9.1 (2007), 99-105.) So in many of his books such as *The Glass Palace* and also his collection of travel essays *Dancing in Cambodia, At Large in Burma* (2008), *In an Antique Land* etc, he talks about pre-colonial economic, social and cultural encounters India has had with countries and cultures other than European. This is one of the most important strains in all of Ghosh’s oeuvre. It is with this same revisionary zeal that he broaches the hitherto unexplored territory of the institutionalization of western science in India and related issues, he makes a fervent effort to revisit Indian science as a phenomenon, *inter alia*, in the pre-colonial times, which is a valid point of departure for an enterprise such as this.

The critique of science both as a discipline as well as practice is evident through Ghosh’s work. His apprentice novel, *The Circle of Reason* (1986) presents the ludicrousness of mimicry of the western model of science by the Indian elite. The central protagonist, Balaram is a representative of the generation of Bengalis that were mimicking the western models of science in an unapologetic way as the path of reason and freedom. In setting up a society of science during his days at Presidency College, he seems to be uncritically spawning a network which is impenitently like the many British institutions of the nineteenth century. His absolute ardour for Louise Pasteur and the importance his biography holds for him is carried to the point of ludicrousness. His uncritical acceptance and further practice of phrenology is undercut by irony because it was known to be used for racial profiling in the colonial times. The one redeeming factor of the book is the ‘School of Reason’ set up by Balaram as competition to the other school in the village. In all earnestness he sets up the school - a utopia, which imparts learning from western as well as indigenous sources, but it all ends rather abruptly in a conflagration.

16
Similarly *The Calcutta Chromosome* (1996), a mystery novel with many layers of meaning embedded in it takes on the enterprise of colonial science. The charged atmosphere of colonial times is an apt setting to study the politics of science. Through the reconstruction of the story of Ronald Ross, the novel casts a shadow of doubt on the credibility of accolades showered on him by recognizing his mettle in discovering the vector for malaria and thus bringing the suffering of people dying of malaria to an end. Ghosh, instead resurrects the role of the Indian menial workers looming in the background of Ross’ laboratory. He suggests the possibility of an underground ‘Indian science’ through the book which can be read as a counter text to the many scientists’ biographies written during this time. The story of Ross is reconstructed through the voice of Murugan, a yuppie Indian-American in an irreverent, iconoclastic and yet thoroughly entertaining manner. The book, as suggested before, also hints at the possibility of the existence of a parallel Indian science that is silent and yet engaged in the pursuit of the ‘Calcutta Chromosome’ that will make the possibility of immortality a reality. The book also brings out the tendency to reject the possibility of science emanating from non-western countries. By revealing Ross to be a pawn in the hands of the secret Indian science organization, he subverts this dominant view. This book in Ghosh’s oeuvre is the one that takes on the issue of science in the most direct and sustained way.

The singular achievement of this book, which is a mystery thriller, is that it forces the readers to look at the silences that have engulfed the area of science in India- it is an area plunged in darkness and cannot be seen except by distortion. Their science is played out in nooks and shady corners, in the antechambers and in the empty halls of dilapidated buildings and never like the one practiced by Ross, in a well ventilated laboratory designed for the purpose. The emphasis on individual authorship in the West has, to an extent, given it the lead in claiming many scientific discoveries as their own. The narrative of the discovery of the vector of malaria, for instance as revealed in his memoirs, was due to the many contributions of the menial help in the laboratory of Ronald Ross.(See Chambers ‘Conversations’ ) Ghosh takes up this incredible fact of history and spins a mystery novel set in the colonial times around it. He questions the grand narrative of western science which has attributed the discovery of the malaria vector to Ross without due acknowledgement to the sources.
he relied on. Also the standard cure for malaria was quinine which was made from the branches of cinchona tree - both the remedy and cure were first revealed to the Spanish conquistadors by the Native American tribes for whom the use of quinine was standard. 10

His most recent two books of Ibis' trilogy: The Sea of Poppies (2007) and River of Smoke (2011) highlight science and technology in the colonial context. In addition to his thesis about the differing ideologies western science in the nineteenth century, the books talk about opium trade and the many labyrinthine networks that propelled the production and sale of the finished product in the Chinese markets. These books also expose how science and technology was complicit with the Imperial trade and profits.

The main argument in this study draws from some of the characters that represent the changing face of western science as a discipline in colonial times. To understand this progression that western science itself underwent during colonization, the study revisits the Romantic and Victorian times as signifying two varying epochs in the progression of western science. The argument is that the romantic approach to science that idolized nature and saw science as an instrument to unravel the bounties of God was replaced in the Victorian times by a more utilitarian and mechanistic science. Further, the argument is expounded by examining the use of science in broaching the colonies through means of evaluation and measurement as a hallmark of the Positivist spirit of Victorian times.

The study takes into account the institutionalization of western science as a discipline through scores of science societies in colonial India and the lesser known aspects of racial discrimination against Indian scientists who were seen as merely the data gatherers and never the theorists and eventually the replacement of Indian schools of science by the overarching structure of western science. As mentioned before, apart from these minutiae that the thesis addresses, the broader attempt is to understand the use of science as a discourse of power in the service of Empire. Science was the ascending power of the Nineteenth century and the idea of progress propelled by science captured the popular imagination very intensely.

In Europe the nineteenth century saw the popular participation in the questions
involving science. Many scientific societies in Europe at this time brought home the import of discoveries to lay people. Thomas Kuhn mentions about the decline of the culture of popular book writing amongst scientists in the present times and argues that the books are being replaced by academic papers. In fact, he goes to the extent of suggesting that any scientist who writes a book today will get more discredit than credit. (Kuhn 6) This goes on very importantly to explain the change that science has witnessed as a discipline in the past two centuries. From being practiced and appreciated in the public domain, it has now with its jargon and specialization retreated into a cocoon which people at large feel unequipped to react to. However, in the Nineteenth century *The Origin of Species* (1859) became the defining book of the epoch: it set the tone for the troubled Victorian times, it muddied the sparkling waters of religious belief and brought in its stead doubt and dilemma. It was a book read by a cross section of population—from farm hands to Queen Victoria herself. The contribution of the amateur scholar in the growth of science at this time had a deep connection with the spread of Empire. (Chakrabarti 34) Hundreds of Colonial Army and Civil Officers moved into the colonies brimming with their amateur interest in the burgeoning sciences of botany, zoology, geology, astronomy—keen on researching on one or the other phenomenon that interested them.

The subsequent spread of the empire and the strengthening of a utilitarian ethos as much defined the future course of science as it did that of the empire. The Ibis trilogy talks about the installation of technology—a grand opium factory in the heart of a small hamlet in Bihar. From a romantic view of Botany as a means to unravel the divine design, here in the Victorian times one encounters the nadir of utilitarianism, in the cultivation of poppy for profits alone. The use of technology towards the processing of opium reveals the dark underbelly of the Utilitarian philosophy endorsed by the colonists. That it was this hinterland that became the new wealth generator for the British after the spice trade became unprofitable is a facet of British economic imperialism that is a lesser known not only amongst the Indians but also the British. According to Ghosh, the reason behind this silence was that both Indians and Britons connected with this trade were ‘prim, pious and thoroughly genteel’ and therefore ‘succeeded in wholly expunging the memory of that involvement.’ (Reddy 62).
It was a new triangle that defined the resurgent British economics at this time-opium produced in India, processed by the British in Indian *carcannas* and sold to reluctant Chinese markets. This unabashedly immoral trade wrecked havoc upon the Indian fields which bled with crimson parasites growing out of their chests, the Indian peasantry forced into opium cultivation and the Chinese social fabric ripped apart with their young turning to opium addiction. Concurrently in the Americas, slavery was abolished and there was an acute vacuum in the labour market. The British needed hands to work on their fields and plantations abroad. The plight of the Indian peasants and the need for labour abroad—these two factors got together and Indian shores saw bands of poor impoverished Indians leaving their lands forever as contract laboureres or *girmityas*.

In addressing the indentured labour issue of this time, Ghosh is trying to engage with the repercussions of the Opium trade for the peasantry of India. The manipulation of the concept of free trade gave them a license to push consignments of opium into the mainland of China. The excesses suffered by the Chinese on account of the abuse of opium led to a resistance to the import and subsequent smuggling of Opium into China. The British continued to be defiant and the standoff between both sides led to the Opium Wars (1839-42 and 1856-60). *Sea of Poppies* (2008) and *River of Smoke* (2011) build on these volatile circumstances that led to the wars. The use of technology to process opium and the navigational acumen of the British are underscored in the books. While this aspect about opium is the most obvious one, there are less obvious, nuanced uses that Ghosh so typically slips in—Opium as an instrument of drugging the newly wed Deeti who is subsequently raped by her husband's younger brother, all this on the mother-in-law's behest and in a bid to impregnate her with a child, something her husband is not fit to do.

Deeti, in an attempt to find out the true paternity of her daughter administers little doses of the hard *akbari afeem* into whatever she served her and eventually it pays off with the mother-in-law spilling the beans about Deeti's younger brother-in-law being the father of her daughter. In a moment of reflection Deeti understands the wider implication of this phenomenon, the rationale behind the opium trade: ‘...if a little bit of this gum could give her power over the life, character and the very soul of this woman, then with more of it at her disposal, why should she not be able to seize
Deet's life is linked inescapably to opium—her husband is a carcanna worker, becomes an opium addict and wastes away. She is forced to sit on her husband's funeral pyre and commit sati. She has the courage to elope with Kalua, the low caste and both go in hiding for a very long time till an opportunity in the form of a schooner presents itself. They decide to join the crew of the Ibis and go to Mirich (Mauritius) as girmityas (indentured labour). It is precisely this moment of departure which is most poignant - Deeti, illiterate, a farmer's daughter, who was leaving her young daughter behind with the feeling that she was never going to return, going to a land of which she knew nothing. Ghosh tries to imagine this moment very intensely without being sentimental.

Like in his earlier books, Ghosh draws up an incredible lineup of beautiful characters whose lives crisscross in gentle ways and take the story forward, in Sea of Poppies all these characters come together on board the Ibis and begin their journey together. The ships and schooners used to transport indentured labourers were mostly former slave ships and the Ibis is one such vessel. The lines between men and women, officers and seamen or 'lascars', black and white are very pronounced and translate into divisions on the ship. The quarters of the labourers are cramped, filled with reeking stench of stool, urine and vomit as these landless farmers try to acclimatise themselves on their first journey in the sea. There is no dignity in death as there is none in life and the corpses are unceremoniously tipped over into the waters. Ghosh gives voice to the untold privations suffered by the girmityas crossing the kala pani for the first time, severing all ties of religion and caste, relinquishing all the old communities and binding themselves in the only new relationship available to them, that of jahaz bhai. Thus in Sea of Poppies he underlines the changing face of science that is interested in the production of economically viable crops — to the extent that it does not see it unethical to cultivate opium and then to use of technology to process it as a finished product for sale abroad.

Technology is the outer manifestation of the scientific principles understood— it has a potential to be more visible and to affect ordinary people’s lives on an everyday basis. In the other title of the Ibis trilogy, River of Smoke, (2011), Bahram, the Parsi trader is the son-in-law of a ship industry magnate. His father-in-law’s indigenous ships have been supplied to the East India Company and the Royal Navy.
However, the trade embargoes imposed by the British on the sale on Indian ships in their markets leads to a gradual ruin of the Indian shipbuilding. It coincides with the gradual decline of their original patrons, the Mughals and the fact that the British introduce steel to replace in the building of ships. Bahram comes to inherit the father-in-law’s declining business and decides to diversify into the ascending opium trade. Ghosh has portrayed through these characters the fact that indigenous technology was mercilessly outmoded by the new utilitarian ethics that was formulating laws to its advantage alone.

*The Hungry Tide* (2004) puts into relief the idea that knowledge systems have much to learn when they come into contact with each other. Piyali Roy, an Indian-American cetologist comes to India to study the Gangetic dolphin. She is Bengali by descent but having been raised in America does not speak Bengali. She is an American for all intents and purposes. When she arrives at a small village in the Sundarbans, she comes into contact with Fokir, a poor illiterate fisherman. She however discovers that he is a repository of great wisdom and knowledge pertaining to the treacherous waterscapes of the Sundarbans. Since for an outsider it is a very treacherous topography to understand and work in, she asks for his help. Fokir’s mastery of the seas emanates from the deep bond he has forged with these waters since his childhood.

Piyali’s quest is that of a researcher committed to the idea of knowledge. She falls in the same tradition as Pierre Lambert, in *River of Smoke* who had ventured to this difficult territory to catalogue its peculiar fauna. Fokir, on the other hand shows the side of traditional and folk wisdom which has always been slighted by the mainstream knowledge systems. Piyali is able to broach the Sundarbans only with Fokir’s help and such is Fokir’s mastery of this area and its wildlife that he is able to help out Piyali with the expected movements of the packs of dolphins as they meander in the waters exploring the waters. The unexpected cyclone wrecks havoc and the two are stranded in the middle of the sea where they take refuge on the branches of a tree. Fokir dies shielding Piyali from harm. Piyali decides to stay put and run a charitable education trust in Fokir’s memory.

The novel is also very deeply about the issue of translation. One of the
important characters in the book is Kanai Das, a translator by profession. He runs a translation bureau at Delhi and travels to Sundarbans to see his aunt Nilima Roy who runs an NGO there. The issue of translation as a phenomenon has as much to do with language as with ideas in this case. Being too much of a Chitranjan Park bred urban Bengali, he has little in common with Fokir and in comparison feels drawn towards Piyali and her mission. He is eager to help her with whatever resources he can muster. While Piyali and Kanai can communicate with perfect English between the two of them, Piyali and Fokir have to overcome the language barrier- Fokir knows absolutely no English and Piyali knows no Bengali. Whereas the two soon find a code to communicate, Kanai’s professional zeal as a translator is no help. Ghosh wants to show that ideas can travel across the divide of language if the desire to communicate is genuine. It hints at the translatibility of ideas and synthesis of knowledge- after all Piyali could not have ventured into the seas without Fokir’s help and at the same time with Fokir’s untimely demise, the difficult tracks he has shown to Piyali are now recorded in her GPS. With the help of her gadget she will now be able to retrieve the useful information and venture out even if Fokir is no longer alive to guide her. The emphasis on translation in the novel and the synthesis of knowledge systems is really at the heart of the novel.

The book located in the Sundarbans also shows the more treacherous side of nature’s fury. The book reveals weak moments of the protagonists when exposed to nature. They feel stripped and defenceless in the face of calamities that can be unleashed at any time. It is an area lashed by unexpected storms and cyclones, an inhospitable jungle infested with man eating tigers, a treacherous terrain where land and sea constantly exchange forms and yet the tidal country with its jwar and batha is a unique ecosystem- home to many who will not trade it with any other location in the world. The book also interrogates very fundamental issues like progress, development and knowledge and by locating the story that talks about these issues in the Sundarbans, it takes us to a state where all these undergo a reevaluation. More than anything else the novel is a call to preserve the pristine and unique ecosystem of the Sundarbans which is facing the danger of being disturbed.

The ambit of the study not only includes the exploration of the use of science and technology to the construction of oversees dominions, it also sees science as a
discursive field in which and through which colonialism finds a justification. The study is based on now widely recognized assumption that science is a social activity: one that is actively determined by the socio-cultural and economic forces of the context. And like Arnold says: ‘Science, far from being monolithic, 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) Science thus ‘reveals itself as much more contingent and culturally specific than it was first assumed to be.’ (Stepan quoted by Arnold 1). For a long time science has occupied a space which is apolitical and by extension beyond contention. This assumption springs forth from the understanding that sees the progress of science as an unproblematic continuum of inventions that has brought in its wake material progress and comfort. However, to situate science in a sociological matrix gives us a more nuanced understanding of progress in human societies. And to study the impact of transfer of practices of Western science in the wider context of colonialism reveals the power inherent in the discourse of science. This line of thought has been in currency in the Social Sciences and especially in history it has inspired a host of scholars to investigate related concerns like politics of Missionary hospitals, the state of Pre-colonial science and technology, indigenous reaction to introduction of Western science, the question of modernity in India, the impact of Western science on Indian society, curriculum and indigenous science etc. Early studies like that of Charles Forman (1941) and George Basalla (1967) (discussed by Arnold, 2000) paved the path for furtherance of the basic contention that science is not ideologically innocent and that science and society are linked in ways we do not conventionally acknowledge.

Basalla proposed a model to exemplify how western science came to be diffused from its European ‘home’ into the colonies in three distinct phases. (Arnold 9) In Phase One, the European countries establish contact with the colonies. The ‘non-scientific’ colony serves as a source of scientific data which is culled out through modalities like surveys, maps, mineral, plant and animal sample collection. In the second phase colonial scientists (who were assumed to be white) come to participate in scientific activities. The colonial science is to a large extent dependent on endorsement by the metropolis. The many science societies of Europe became the monitoring agencies for scientific research worldwide. In Phase Three countries strive
to establish a National scientific culture of their own. A culture of education and science ruled by the needs of the country gradually evolves. Bassala’s model was current for a long time in the absence of any other model of science in the colonies. He tried to bring into centre stage, the idea of ‘colonial science’ - which in itself is a very provocative idea because it conceives of science as a structure that can be built upon a given purpose, which in this case was colonialism. One could disregard the unilateral flow of science from the West to the colonies as the pivotal presumption, however, as mentioned before, Bassala’s tacit understanding of science being affected by socio-economic and political circumstances is hugely acknowledged in a model that conceives of the notion of ‘colonial science’- where science being affected by extraneous circumstances is a valuable basis. (Arnold 9-15)

His model is based on the underlying assumption that the coming of western science to the colonies led to a dissemination of science from the metropolis to the colony. Subsequent theorists have taken on him for his total disregard of the colonized societies as having any science of their own. His theory, broadly based on the developmental teleology was premised on ‘the assumption that the spread of western science to the rest of the globe was both beneficial and inevitable.’ (Adas quoted by Arnold 12) Further he was of the generation of scholars for whom science was ‘value neutral, objective, empirically demonstrated, somehow transcending time and thus universally valid.’ (12) It sees the non-European colony as passive and supine ignoring the fact that they had scientific traditions of their own.

However, historians such as David Arnold have set themselves against the backdrop of authoritative works of historians such as Joseph Needham (Science and Civilisation in China [1954-2008] ) , Martin Bernal (Black Athena [2001] ) and Lynn White (Medieval Technology and Social Change [1962] ) who have established that as far as science & technology was concerned, non European cultures were not in a state of tabula rasa (as Bassala would have us believe) but had thriving scientific traditions of their own and that Europe has had a long standing debt to Asian technology. Further, western scientific knowledge was actively modified and redefined upon contact with the colonies and far from being passive, indigenous knowledge ‘subverts, contaminates and reorganises the ideology of science as introduced by Europe.’ (Raina and Habib quoted by Arnold 20)
Science, it might be reasoned, was not a property of a single society (located in Western Europe) but could be genuinely cosmopolitan, absorbing and assimilating information and ideas from a wide variety of sources and locations. ‘Metropolitan Science’ did not even have a single, fixed locus of power: the ‘metropolis’ might move over time from one place to another: it might simply represent a way of doing or organizing science, whether in Europe or overseas. (Roy Macleod paraphrased by David Arnold 13)

The present study thus takes into account the transfer of western science at three levels: tool, discipline and discourse. Tools of science are the application of the breakthroughs of science as technology. James Headrick in *Tools of Empire* (1981) and later *Tentacles of Progress* (1988) and Michael Adas in *Machines as the Measure of Men* (1989) emphasise the material side of scientific progress. They look at the technological advancements made by the West which gave it power and control over nature. With this instrumental control they could venture out using their ascending navigational skills and their superior arms and ammunition. The study looks at the use of technology in exploiting the resources of the colonised countries. In casting a critical look at the institutionalization of science, the study critically looks at the strengthening of Western science through passage of Laws and acts that strengthened the hold of western system and discredited the other systems that had existed in India prior to the introduction of western means and methods. Thirdly, the discourse of science, as has been mentioned by the way of introduction before, is the power accorded to the discipline of science and its collusion with the process of colonialism.

The use of the vocabulary of science, enlightenment and reason, which formed the very bedrock of the British Empire was very compelling indeed. It found favour amongst the elite educated class of Indians who were being educated in the western tradition. It became, what Prakash calls the ‘organising metaphor’ in the discourse of the western educated elite. (*Science* 60) One class amongst these was that of the social reformers like Raja Rammohan Roy who started using reason as the benchmark of religion. Others like Swami Dayanand advocated a call to go ‘Back to the Vedas’ wherein they felt, the authentic spirit of monistic Hinduism lay. (Prakash *Science* 72) Their view was that Hinduism has been corrupted by centuries of exploitation by the corrupt priestly class and had to go back to its fountainhead, the Vedas to find back its pristine glory. Similarly they started using reason as the benchmark for evaluating the
social practices and hailing in a scientific modernity in the process.

There were, however, others like the members of Theosophical Society, an organization formed under the leadership of M. Blavatsky and Col Henry Olcott who saw in western science the absolute nadir of crass materialism. They looked upon Eastern religions like Hinduism and Buddhism as source of ideas that could counter the immorality leashed on the world with the spread of western science in this way. ‘It was formulated at the intersection of ancient religions and modern science, containing a heady mix of clairvoyance, mesmerism and hypnotism, and was presented as a form of knowledge, or an occult science, that surpassed the understanding of modern science.’ (Prakash Science 74) The Calcutta Chromosome makes a brief mention of the Theosophical Society as a centre of mystical supernatural activity. Whether the society is shown as mystical because it is anti-western science, therefore, it can only be mystical and not rational or because they could only criticise western science only mystically and never rationally is a moot question.

Another significant position that was unabashedly anti-western science and technology is that of Mahatama Gandhi. Even though Gandhi was a preoccupation with the trimurti12 of Indian Writing in English and has not seen any representation in Ghosh’s oeuvre, it is imperative to bring in a discussion around his ideas about science. Since The Calcutta Chromosome moves in different chronotropic chunks but one of the major ones is the Pre-Independence India, it will be a travesty to leave one of the most original thinkers out of this discussion. Since most of Gandhi’s arguments were built on the touchstone of morality, he saw western technology in no different light. He saw technology and the machine as the source of the evil of colonialism. He elaborated on this aspect of technology in Hind Swaraj, (1910) a slim volume that takes on science as the scourge of modern times. He can also be seen as one of early environmentalists in his advocacy of the model Indian village which is self sufficient and thrives on its own sources of energy. The formative impact of Romantic thinkers like Rousseau and Thoreau is evident in his critique of industrialisation, even though his own prescriptions to rectify the problems of Indian society were not overarchingly romantic but pragmatic and moralistic.

One of earliest treatises Hind Swaraj where Gandhi’s argument is that complete freedom for the Indians would not only be political but also freedom from
bondage of the modern western machine civilisation which could corrupt the very core of Indian civilisation. He lashes out against railways, the professions of law and medicine as agents of this corruption. It is in this context that we can appreciate his dedication to the ideals of *swadeshi* of which *khadi* and *charkha* became very powerful symbols. John Middleton Murry hailed the book as one of the ‘spiritual classics of the world’ and Gerald Herald praises it as ‘one of those books about which it may be said that they are not so much books as great natural phenomenon.’ (Quoted by Naik 127) According to Sunil Sasarabudhay: ‘He (Gandhi) argued in great detail about how the machine emasculates man both spiritually and materially. He even tried to build his challenge to imperialism around the *charkha.*’ (in Raghuramraju 172).

Partha Chatterjee sums up the argument in *Hind Swaraj* thus:

> Fundamentally Gandhi attacks the very notions of modernity and progress and subverts the central claim made on behalf of those notions, namely their correspondence with a new organization of society in which the productive capacities of human beings are multiplied several times, creating increased wealth and prosperity for all and hence increased leisure, comfort, health and happiness. Gandhi argues that far from achieving these objectives, what modern civilisation does is to make a man a prisoner of his craving for luxury and indulgence.’ (in Raghuramraju 77)

Gandhi’s ability to link up economic and scientific states with social morality and further to diagnose a larger pathological reasoning about imperialism from the side of both coloniser and colonised is hinged on this principle.

The growth of western science as a phenomenon and discipline owed a great deal more to the colonial enterprise than has been acknowledged. Whether it was the scientific and technological acumen that helped the imperial powers make inroads into the new world or for that matter the churning that western science itself experienced on being relocated in the colonies is the task cut out for this study. Ghosh with his credible line up of characters and his masterly portrayal of the colonial times has attempted to broach these areas with a characteristic doggedness. His nuanced understanding of the colonial history along with his interest in the politics of knowledge lends an exciting edge to his oeuvre for understanding the politics of
science as it unfolded in the colonial times and climes. The attempt of this study to reevaluate the Romantic tradition vis-à-vis science as opposed to the mechanistic Utilitarian one and has a resonance in the present times when once again the environmental groups are emphasizing on the absolute need to restore the harmony of the relationship between nature and man.
End Notes:


3. Joseph Needham (1900-1995) 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.

4. Cornell Professor Martin Bernal’s *Black Athena: The Afroasiatic Roots of Classical Civilisation* (2001) is a three volume work where he discusses the effect that Ancient Egyptians and Africans had on the Greek civilisation. Bernal’s central argument it 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.

5. One can consider the views of Lord Curzon (Viceroy from 1899-1905), who was said to be a votary of the use of science to spread and ‘contain’ Empire. Consider, the following speech given by him:

   We are trying to graft the science of the West on to an eastern stem...we have raised entire sections of the community from torpor to life and have lifted India on a higher moral plane...in proportion as we teach the masses, so we shall make their lot happier and in proportion as they are happier so they will become more useful members of the body politic.

   *(Lord George Curzon quoted by Baber 185)*

6. When I talk of ‘ecological’ science, as a phenomenon, what I am referring to (and the latter discussion in the chapter on Romantic Science will expound on it in much
greater detail), is a philosophy of science that attaches profound importance to nature and especially the connection and the flow of energy between nature and human existence. Science was in the Romantic tradition (as this study sees it) was about unravelling the divine design through the close observation of natural phenomenon than the instrumentalist exploitation of nature for man’s benefit, a view which became entrenched with the Utilitarian thought.

7. Shiv Vishwanathan describes the approaches to historiography of science in terms of two oppositions: the externalist and the internalist critique of science and the exoteric and the esoteric. The externalist approach focuses on the social organisation of science. It analysis the role of professional societies, universities, industrial research, laboratories and multinationals. The internalist approach concentrates on ‘nature of science itself as a mode of cognition. Such an approach would examine the attitude of modern science to nature, its mathematisation or the vivisectionist violence of the scientific experiment.’ He then moves on to the opposition between exoteric and esoteric approaches. The esoteric concern is the Gnostic, occultor alchemical roots or readings of modern science. The exoteric approach restricts itself to a more linear view of science, present in the conventional histories of science. Shiv Vishwanathan. ‘The Strange Quest of Joseph Needham’ in S. Irfan Habib and Dhruv Raina eds. *Situating the History of Science: Dialogues with Joseph Needham*. New Delhi: OUP, 1999. 198-99. The essays in this volume were originally presented at a conference organised jointly by National institute of Science, Technology and Developmental Studies (NISTADS), The Delhi Science Forum and Maison de Sciences de l’Homme, Paris at New Delhi in September 1996.

8. In Chapter 3, a detailed analysis is made of the influence of Utilitarian thinkers like James Mill on the policy of education enunciated by the likes of Charles Grant and T.B. Macaulay.

9. In an elaborately constructed laboratory scene, Farley, a white scientist is looking through the slides, which are being supplied to him by the Indian laboratory attendants, Mangala and Lutchman. The scientist senses their impatience and unrest in supplying him the same and attempts to catch their reflection through the steel tumbler which is lying next to him: ‘ the distorted reflections of their faces seemed to take on a grotesque and frightening quality as they nodded and pointed across the
room. Farley quickly lowered his head into the microscope, while watching the glass out of the corner of his eye.’ (124-25)

10. Etymologically, the word ‘malaria’ can be traced to the word miasma which means ‘bad air.’ The Europeans had believed that malaria was rampant in tropical climes because of the marshy areas that produce the quality of air that leads to this sickness. With colonization, diseases like malaria became a concern because many officers were succumbing to it. This became an important reason why Europe became interested in researching on the disease. (Baber 170)

11. That Ghosh’s trilogy is named after a ship Ibis could be deconstructed as an attempt on the author’s part to get the readers to focus on the technology aspect of the story: it is a schooner that changes Deeti’s life by transporting her away from India as a girmitya (indentured labourer) and earlier, the Opium factory occupies a pride of place in Deeti’s hometown. As shall be elaborated later, both renderings of this form of British technology magnify the unjust and immoral use of technology in the colonies.

12. Some of the important institutions that helped popularize science were: The Royal Society (Established 1662) and later The British Association for the Advancement of Science (Founded 1831) – these became the epicenters of creative activity and fulfilled the function of bringing the different spheres of creative activity together.

13. R.K.Narayan, M.R. Anand and Raja Rao are collectively known as the trimurti of Indian writing in English. Critics like Naik have used the term the ‘Gandhian Whirlwind’ to describe the impact of Gandhian ethos on their writing.