

*Indian Journal of History of Science*, 32(2), 1997

## GURU JONES—A PRIVATE ENGINEER IN THE COLONIAL TRAP

AMITABHA GHOSH\*

(Received 21 January 1997)

William Jones was the first private engineer of the age of steam who migrated to India in 1800. He established a big industrial complex near Calcutta. He was instrumental for the employment of steam power in town water supply of Calcutta and in the Srirampur Paper Mill. He was the first prospector of coal in India who could mine pit coal and ensure an uninterrupted supply of it. Artisans of Howrah, the industrial twin city of Calcutta, who had their state of the art training from Jones, endearingly addressed him *Guru*, meaning teacher in vernacular. Jones also made his mark as an architect and builder. All these achievements, however, led more to conflict than collaboration with the East India Company. Jones' industrial empire crumpled soon after his untimely death in 1821 and his family was ruined.

**Key Words :** *Private engineer, Steam engine, Coal mining, Colonial constraints, Technology transfer, Industrial revolution, East India Company, Guru Jones, Gothic architecture, Howrah, the industrial twin city of Calcutta, Cotton Screws, Cartridge, Raniganj coal field.*

### INTRODUCTION

William Jones, not to be confused with his namesake Sir William Jones, the famous Indologist, was the first private engineer of the age of steam who migrated to India in 1800. Jones established an industrial complex consisting of cotton screws, rope and canvas manufactory, a paper mill and an engineering workshop. As a consultant engineer he was responsible for employment of steam power in town water supply of Calcutta and in the Srirampur Paper Mill. He got himself engaged as a prospector of coal by the government and was the first in India to produce pit coal and ensure an uninterrupted supply of it by taking cognizance of human and natural resources. Artisans of Howrah, the industrial twin city of Calcutta, who had their state of the art training from Jones, endearingly addressed him "Guru", meaning teacher in Bengali. Jones also made his mark as the architect and builder of the first Gothic edifice of India. All these achievements however led more to conflict than collaboration with the East India Company. Jones' industrial empire crumpled soon after his untimely death in 1821 and his family was ruined.

---

\*26 Central Road, Calcutta-700 032.

Among different modes of cultural contacts, colonial conquest is also one which leads to transfer of technology. India under British rule provides many examples of how an imperial power "can *choose* to bring the latest inventions to the colonies".<sup>1</sup> Around the word "choose" hangs the preference of some artefacts over others. The preference underwent changes according to the changing dictations of the frame of time. Steamboats, railways and electric telegraph were chosen to be introduced only when they found application as tools of the empire<sup>2</sup>. At the same time, technology-transfer was monitored by a complex process leading to the maintenance of the technological disparity between the donor and the receiver. One of the components of the process, the gratification of the psyche, was hinged upon symbolizing the tools of the empire as manifestations of a higher order of ingenuity and technological achievements<sup>3</sup>. Modern historians of technology have argued that technologists as a group, inventors, innovators and even skilled practitioners became cultural heroes during the British Industrial Revolution<sup>4</sup>. Contextually it has also been pointed out that there could be "other cultures" which condemn technological novelty (change). In the Muslim tradition, George Basalla writes, "innovation or novelty is automatically assumed to be evil until it can be proven otherwise and applies to innovations made by believers of Islam as well as those imported from other cultures."<sup>5</sup> Closely related to this "observation" is the argument which confines pursuits of novelty within the 'Western World' and their idea of progress.

The following account of the travail of William Jones, it is hoped, will make it necessary to reconsider some of the generalisations which are popular about the process of technology-transfer and assertion of technological progress as a measure of "culture". Industrial Revolution had already gained considerable momentum when Jones sailed for India. It was the time when engineers were being transformed into icons in England but as an agent of diffusion of modern technology and transmission of skill in India, Jones' pursuit did not bestow upon him anything which a cultural hero is expected to receive.

1800 to 1821, the tenure of Jones in India, was the period which saw deindustrialisation of India under Company's rule. It was the period when cotton piece goods were eliminated from East India Company's investment list consisting of raw silk, sugar, salt petre and indigo. Indian manufacturers of cotton piece goods were first beaten down with prohibitive duties followed by importation of machine made goods from Europe.<sup>6</sup> Apart from improving the cotton screws which helped to increase the weight-to-bulk ratio for affecting a more economical transport and manufacture of cartridge paper which helped the Company to win a colonial war, the Company found very little use for Jones' activities could certainly have been considered counter-productive to the colonial

interest of the time. The contemporary imperial voice was unhesitating in its statement, "As in all semi-barbarous countries, the manufacturing industry in India will decline in proportion as its intercourse with a civilized manufacturing country increase."<sup>7</sup> Investment in a colony to promote selective manufacture was not yet at sight and Jones as an immigrant engineer had to encounter insurmountable hurdles.

#### ALBION MILLS : THE CITADEL OF JONES

At the beginning of the 19th century, William Jones like many of his countrymen came to India as a fortune hunter. But among the numerous adventurers he was an exception in the sense that he did not engage himself in trade but in manufacture and industry. Jones arrived in India in 1800, about twenty three years before the appearance of the first practical steamboat in India and it was four years after his death in 1821, that the first steamship from England reached the Indian shore.<sup>8</sup> It was only after the establishment of the regular steam shipping that steam-age engineers made their presence felt and all of them belonged to the fold of militia.<sup>9</sup> Jones was perhaps the solitary private engineer in India in the early 19th century, who unlike, say Jessop & Company, had no parent company at home to formulate guidelines of his Indian endeavor. Jessop, one of the modern houses of engineering in India was established before Jones' arrival. But firms like Jessop failed to strike root in the Indian soil for ages to come because interests of their Indian enterprise were always secondary to those of their parent companies. Here is a contemporary example. In 1825, when Indian government was considering a proposal from one Mr. Heath seeking exclusive right of establishing iron works "similar to those in Europe", a serious objection was lodged by George Jessop, "As a partner in one of the largest Iron Foundries in Great Britain, I (George Jessop) beg leave to enter a protest against the proposed grant to Mr. Heath...in the Company's territories in India. The works belonging to myself and partners in Calcutta were purchased by my brother Hy. (Henry) Jessop for the purpose of forming a connection with the Butterly Iron Works at Home it is therefore not to be expected that under such circumstances I should wish to encourage the manufacture in this country of an article, the sale of which I am interested in promoting in my own Country and which forms so great a revenue and gives employment to thousands. Should Mr. Heath still preserve in his intentions, I shall rely on the wisdom of the Legislature in refusing to grant that which is inimical to the interest of Great Britain."<sup>10</sup>

Jones was a lost heir to an Irish dukedom and after leaving his home because of family quarrels<sup>11</sup> apprenticed himself to Boulton & Watt Company<sup>12</sup>.

Boulton & Watt, as we all know, was a rewarding combination of investment (Boulton) and technology (Watt), which more than any other firm powered British Industrial Revolution with steam. Jones was requisitioned by East India Company to improve the Cotton Screws. He declined an offer from the Company to article himself for a certain number of years and arrived as a "mechanic".<sup>13</sup> Very little about the early career of Jones is known. Around 1804, he solicited appointment as a foreman in the Calcutta Mint. The Mint Committee also recommended him but for reasons unknown he did not join the service.<sup>14</sup> On the other hand we find that the Mint committee engaged him as a consultant engineer in 1808 "to examine and report on the present state of machinery in the Mint....and to furnish an estimate of the expense of ventilating the melting rooms and some other improvements".<sup>15</sup> According to Jones' advice bullocks were introduced in operating the Laminating Machine which was so long worked manually. It is however difficult to ascertain Jones' role behind the introduction of steam power in the laminating department in 1817-8.<sup>16</sup>

Jones brought about a number of improvements in the screw presses which were found "highly beneficial to the Hon'ble Company and the mercantile community of Calcutta."<sup>17</sup> It was in 1811 when the annual directories of India conferred a little more dignity upon him and the "mechanic" emerged as a manufacturer.<sup>18</sup> Subsequent to his employment on the Screws, he built a Screw House on the western side of the river opposite Calcutta and by "carrying out a Pier Head, caused an alluvial deposit there".<sup>19</sup> This is the place now known as Shibpur, belonging to the district of Howrah in West Bengal. Towards the close of the 18th century an island formed on that place narrowing the river and Jones tried to make it a part of the main land. He not only developed Shibpur, it was his home from where he conducted all his subsequent ventures and expeditions. Albion Ghat (the landing place), Albion Lodge and Albion Mills of Shibpur were all created "by the energy of one of the most enterprising men in the annals of Indian improvement, and one of the greatest benefactors of the country," wrote J.C. Marshman in tribute to Jones in 1844.<sup>20</sup> Jones went on gradually with his works and set up two Cotton Screw Houses, a brass foundry, a Smithy and a paper manufactory with an extensive range of godowns on a continuous quadrilateral plan.<sup>21</sup> By 1809 he had established a rope and canvas manufactory to meet the requirements of the sailing ships. Testimonies of commanders of ships published in 'Telegraph' confirmed that the quality of both the rope and the canvas was equal to and in some respects even better than the European products. The voice of the contemporary newspaper was unhesitating in acknowledging the skill and industry of Jones and we read, "that no individual, possessed of greater mechanical knowledge, or who has employed it with more successful application, ever arrived in this country than

the gentleman here mentioned."<sup>22</sup> However, hopes of locally manufactured rope and canvas superseding European products<sup>23</sup>, as was entertained at the time, was certainly a factor which did not go in Jones' favor. When an expedition was about to be despatched in 1811 for the capture of Java, its departure was impeded by the want of cartridge paper and Jones' extraordinary mechanical skill enabled him to set up a small paper works from which he furnished all the paper that was required.<sup>24</sup> In this case Jones did serve the colonial interest but once the transient military necessity was over, his paper manufactory failed to receive further encouragement. Soon after the expedition, "he was not encouraged to continue his exertions".<sup>25</sup> Marshman admitted that the Court of Directors was bent upon "administering a colony solely for the benefit of the mother country and fostering improvements only as far as they tended to promote that object."<sup>26</sup> In the concluding chapter we will turn our attention to the aspect of how time and again, under both the Company and the Crown, this question of 'how far and no further' has baffled Jones and his successors and manufacturing activities progressed (or regressed) by fits and starts. It is well known that even the manufacturers of Liverpool, Glasgow and Manchester at one time posed a threat for the monopoly of trade enjoyed by the East India Company. There is little wonder that the private manufacturer in India, irrespective of his colour of skin was faced with ordeals unknown to the non-national speculative traders.

#### COAL AND STEAM

Jones foresaw the inevitability of the introduction of steam age in India and he himself was keen to make a go at it in his own endeavors. The opportunity came when the Company got interested in prospecting for coal, not for the sake of establishment of Industry, but for providing suitable grades of coal to the Company's Gun Carriage Foundry's forge. A heavy expense was involved in importation of pit coal from New South Wales to meet the need of the Ordnance Department.<sup>27</sup> C.W. Gardiner, Secretary to the Government, based on private informations, got in touch with a reputed ship wright of Calcutta, one Mr. Mathew Smith who was using both country coal and iron for manufacture of nails.<sup>28</sup> Smith, in March 1814, informed that he himself had never visited the spot from where coal was collected. Smith however introduced Jones, "who has also used it, and as he has been used to mines and collieries, and from his great knowledge of mechanic (sic!) could soon ascertain if better coal could be found lower with the earth." Jones also annexed a letter from Jones addressed to him.<sup>29</sup> Jones also had never visited the mining area but he knew about the local methods of mining and obtaining coal from the surface (13 to 17 feet below the ground). Jones wrote that the fear of "being buried by the roof falling down" prevented them from trying newer methods of mining explained

by Jones. He was however confident that trained labour would not pose any problem if 'practical knowledge' was applied for working pits. In England, Jones wrote, "it (coal) is commonly worked at about 180 feet and the native habits of working sitting and the flexibility of their bodies give them thousand chance of being good miners."<sup>30</sup> We will have further occasion to observe later, how his command over the local tongue yielded rich dividend in the form of acquaintance with the habits and methods of Indian artisans and unskilled labour. This was a no small factor in his successful quest for relocating modern technology. He never felt the need of importing European labour to run any new manufacturing venture as was done, for example, in the case of the ill-fated cotton mill at Fort Gloster near Calcutta which was set up in 1817.<sup>31</sup>

Jones soon started communicating with the Chief Secretary with whom he also had occasions to meet. Two letters written by him within a span of about ten days in April 1814 provide insight regarding the considerations which merit attention of an engineer before he commences prospecting. The contents of these long letters can be summarized in the following manner<sup>32</sup>:

- (a) Jones considered it necessary to make analysis of the coal as it was then obtained to ascertain the possibility of getting better quality from a greater depth.
- (b) Jones gave an account of the method of fractional distillation and the products obtained thereby.
- (c) Two products of fractional distillation, bitumen and coal gas was identified for their economic importance. In the absence of a good market for coal, Jones was much ahead of his time when he was speculating about value addition. It is interesting to note that only two years after the London streets were first illuminated with gas, Jones took delight in producing a "perfect gas light", which "burnt steadily with a mild white light". Moreover, he was able to store the coal gas in bottles for future use.
- (d) Jones estimated the demand of pit coal in India and made a comparative study of importing 'sea coal' and coal fit for use in the arsenal (forge) from England and New South Wales as against working a mine for pit coal in India which even when "moderately worked was expected to yield about 1000 maunds (33 tons) daily".

Ultimately, Chief Secretary, Govt. of India, engaged him at a monthly

allowance of Rupees six hundred "to examine the country lying in a north western direction from Calcutta with a view to the discovery of mines of coal of a good quality". This allowance was to cover all expenses like hiring boats, bearers, coolies etc.<sup>33</sup> Jones was not interested in making money as a prospector but was looking further ahead, "If I am successful.... I would prefer a small salary and a commission on all the coals sold."<sup>34</sup>

Starting from April 1814, Jones made a remarkable series of expeditions. First he made a two months' trip up the Damodar valley.<sup>35</sup> In September, he again went out on a six months' voyage which took him up the Ganges, to Rajmahal and Monghyr district and then across the then Bengal to Sylhet & Khasi Hills.<sup>36</sup> In the month of June of the next year, he undertook a third exploration up the Damodar valley and this time his prospecting work was carried out in Raniganj coal field proper.<sup>37</sup> Ultimately on 1 December 1815<sup>38</sup>, Jones began sinking "what was to become the most famous mine in India".<sup>39</sup> It was situated about one thousand yards up a tributary, called the *Nunia Nulla* or *Nunia Jhor* which followed into the river called Damodar.<sup>40</sup> Jones sent numerous reports to the Government about the progress of his prospecting work and two of them were posthumously published in *Asiatic Researches* and *Gleanings in Science* in 1829<sup>41</sup>, when coal started assuming color of gold and business houses started waging war against each other to grab hold of areas in or around the Raniganj coal mine already worked successfully by Jones.

In November 1817, Jones expressed the desire of working in a coal mine at Raniganj on his own account and this ultimately proved to be a premature venture. With none of his risks covered by the Government it ruined Jones economically. Jones was granted a loan of Rs. 40,000 by the Government at 6% interest, Alexander & Company standing security. According to the agreement, the interest was "repayable by four equal instalments, the first to be discharged on or before 1st January 1821 and the whole sum to be demandable at any earlier period at which you may discontinue work".<sup>42</sup> Jones took little notice of the pessimistic tone and the unfavourable terms because he never considered the possibility of an untimely death causing 'discontinuance' in 1821.<sup>43</sup>

Jones was not the first to discover the coal seams of Raniganj or that of Burdwan but he was the first to dig up high grade pit coal by sinking shafts. Humphreys writes, "He opened coal mines which were genuinely coal mines and were to have a long and successful future and with him the continuous history of the coal industry had its beginning."<sup>44</sup> Decades later when Bengal Coal Company was formed in 1844, the Raniganj was still the most important mine and even then employing the original 4-5 hp steam engine installed by

Jones for pumping out water.<sup>45</sup> The employment of the steam pumping helped Jones overcome one of the critical problems of pit coal-mining. The Atmospheric Steam Engine of Newcomen and Watt's first batch of steam engines were all specifically devised for and found employment in drainage of mines in 18th century England.

Employment of modern machinery alone however is no measure of Jones' success. When Jones sank the first shaft, it was an unnamed site. Apart from the sanction of the Government, Jones considered it necessary to obtain a *pattah* [grant] for 133 *bighas* [1 *bigha* = 144.00 sq.ft.] from the Rani [queen] of Burdwan and consequently 'Raniganj', the trading town [*ganj*] in the bank of the river belonging to the *Rani* came into existence.<sup>46</sup> Jones' main achievement is centered around the method worked out by him in transportation of coal from Raniganj to Calcutta. It was in "organizational technology" that Jones was at his creative best. From the very first day that he started prospecting for coal, Jones never strayed far beyond the shores of such rivers which could be used as routes of transportation of coal to Calcutta. He worked out a complete method of transportation before he started mining at Raniganj. He wanted to build a few boats, some of three and others of four hundred maunds capacity on the banks of the river Damodar using 'Ramgerh Sal' wood and iron. At the same time he also planned to hire Burdwan boats "whose people are in the habit of navigating the river".<sup>47</sup> The coal was to be carried to the bank of the river during dry season and immediately upon the opening of the river "the new boats shall drop down and the hired ones go up and load with coal as quick as possible and proceed down with it to Amtah and unload there".<sup>48</sup> They could then either return empty or take grains or other articles up, which would pay freight, load again and continue in the same manner so long the river permitted navigation. During the dry season the Amtah-Calcutta route still offered navigation and as such the whole lot of boats were to be loaded at Amtah for forward transmission to different depots. By this method Jones planned to engage the boats throughout the year and believed that they might make six to seven trips annually.<sup>49</sup>

A very simple plan that really worked and worked elegantly for decades to come after Jones' death. It was in fact the only method of transporting coal before the advent of the railways. In 1818, Jones could send only 7000 maunds but in the next two years the figure rose to 17000 and 47000 respectively.<sup>50</sup> About twenty five years after Jones died in 1821, the Raniganj mine, under the management of the Carr Tagore & Company was annually producing about 14 lakh maunds of coal<sup>51</sup> and their shipment was carried out in the same old method. Hundreds of boats of capacities varying from 200 to 600 maunds were

ties to the jetties of Carr Tagore during the dry season.<sup>52</sup> Homfray, a rival of Carr Tagore, who was also engaged in mining, wrote in 1842 that his own boats along with Carr Tagore's after their departure frequently extended to six miles in length, "and is perhaps one of the prettiest sights that a stranger could witness".<sup>53</sup> Mines of Bengal Coal Company in Raniganj in 1844 employed 5000 persons in the mines and 1500 boats with a crew totaling 9000 men to bring coal to Calcutta.<sup>54</sup> The impact of this method of shipment of coal on the country-boat makers is worth a separate research project.

Without entering into a discussion about the fierce competition and feud over exclusiveness of right among the rival mining companies of Bengal from 1831 to 1844 (when Bengal Coal Company was formed), we can simply categorize the bones of contentions. These were centered around : (a) securing mining rights as close as possible to the Raniganj seam (b) use of jetties and (c) procuring labour which often led to enticing them from one mine to another.<sup>55</sup> We already know how Jones' pioneering activities are related to the first two of these factors. Even regarding employment and training of miners, Jones' contribution merits attention. The *Santals* (tribal people) from nearby areas were first instructed in mining by Jones and they mined with crowbars and wedges. Betts, who started mining the Chinakuri colliery from 1831, taught the use of pick-axe to the *Bauris* (another group of tribal people).<sup>56</sup> W.T. Blanford, a geologist, wrote in 1861 that pick-axe being the superior implement, on one occasion, Chinakuri miners were brought to Raniganj to teach the Santals the use of it but they were driven out by the *Santals* and their homes burnt down. Blanford blamed the Santals for their extreme conservatism and commented, "as if the innovation interfered with their religious ceremonies".<sup>57</sup> The question remains, why did not the *Santals* resist Jones when he taught them the use of crowbars and wedges in mining? Were not the use of these implements more alien to them at that time than the pick-axe after they have already gained a number of years' experience in mining pit coal? This again reminds us of Jones' excellent command over the local tongue and the respectful attention paid by him towards the habits and methods of Indian workers. A further study in this context may prove rewarding for scholars who try to explore the cultural, social and techno-environmental obstacles to change.<sup>58</sup>

In 1836, when Dwarakanath Tagore of Carr Tagore & Company purchased the Raniganj mine from Alexander & Company for seventy thousand rupees, it was the "oldest, largest and richest coal mine in India."<sup>59</sup> The age of steam had already arrived by that time and the main customers of Raniganj coal were the steamboats. Tagore's biographer writes, "The purchase of the Raniganj mine was the most important single transaction of his business career."<sup>60</sup> In a bid to

increase production to meet the sharp rise in demand, C.B. Taylor, Carr & Tagore's engineer started depillaring the Raniganj mine.<sup>61</sup> This has been considered by Blair B. Kling as a great engineering feat because in the pillar-and-stall method of mining practiced by Jones, fifty percent of the coal was left in place as pillars to support the roof.<sup>62</sup> But depillaring the mine and substituting the coal pillars with props of bricks and wood or resorting to stowing which was inadequate caused the first cave-in and spontaneous combustion. The cumulative effect of these disasters are fully realized to-day as no modern technology has promised any remedy of the great inundations in the coal belt area initiated by the greedy operators and incalculable amount of coal in the abandoned mines are now beyond recovery.

In 1820, soon after Jones was able to transport 47,000 maunds of coal, he wrote, "This coal I have engaged to sell at 8 annas [0.5 Rs.] per maund let the market fluctuate as it may as at that price it becomes cheaper than wood and is esteemed much more for any reasons than wood can be."<sup>63</sup> Jones was alluding to the use of coal in smithy, iron foundry, burning lime for constructional purposes and feeding steam engines. There were a few stationary steam engines at that time<sup>64</sup> and apart from his own engines at Shibpur and Raniganj, Jones' presence behind the installation of two more steam engines of historical interest can be traced.

In reply to an inquiry from the Lottery Committee which was constituted for the civic development of Calcutta, Jones suggested that the manually worked China Pump at the Chand Pal jetty could be conveniently replaced with a steam driven pump capable of delivering 5 tons of water per minute to a height of 24 feet.<sup>65</sup> The steam engine as proposed by Jones was to be operated for supplying the already constructed aqueducts and flushing the principal drains of the city. Jones prepared the estimate for erecting the first steam engine in India for town water supply and offered for sale a steam engine for Rs. 9000.<sup>67</sup> The Lottery Committee purchased the engine but its installation was completed after Jones' death when it was shifted from its premises in Shibpur.<sup>68</sup> The following observation about the Chand Pal engine made as late as in 1854 is worth quoting. "The steam engine which supplies with water the aqueducts....is one of the most useful establishments in the City of Palaces and the only wonder is, that in a metropolis of so great an empire, which yields a revenue of twenty crores of rupees a year, it is the only steam engine erected for this important object."<sup>69</sup>

The first paper mill in India to employ a steam engine also owes a debt to Jones. Carey, Marshman and Ward, the famous trio of the Baptist Mission

were trying to manufacture paper in a large scale in their establishment at Srirampur in Bengal ever since their printing and type founding activities met with success. The real breakthrough came when according to Jones' advice a 12 hp steam engine was imported and commissioned in March 1820.<sup>70</sup> The Srirampur engine was one of the consumers of Raniganj coal. Here again East India Company made things difficult for Jones by imposing a 10% duty on the coal booked for Srirampur because it was a Danish settlement.<sup>71</sup> Jones' appeal to the Government to revoke the duty as the coal industry was still at its infancy, was promptly turned down.<sup>72</sup> We must also remember that the Srirampur paper mill, the only one of its kind in India flourished till 1845. The transfer of political power from the Danes to the British in this year precipitated the ruin of the paper mill as a result of the "expensive and unsatisfactory contracts made at home by India Office."<sup>73</sup> In the final analysis, Jones' paper mill of 1811 and that of Srirampur both succumbed to the same cause, the negative attitude of the mercantilist Company.

#### DRY DOCK SCHEME AT SAUGOR ISLAND

Two years before Jones embarked upon his Government aided expeditions as a prospector of coal, the spirit of adventure urged him to seek a grant from the Company for colonizing an uninhabited wild terrain in Saugor Island. The plan did not materialize but a brief description of it, none the less, may reveal the working of the psyche of the young engineer and the range of his ambition. Saugor Island in the Bay of Bengal, is situated at the confluence of the river Hooghly and the ocean. Even today it is sparsely populated though it attracts millions of pilgrims once every year. Ages before the present temple of seasonal importance was built, the island flourished as a strategic hamlet. When Jones set his feet on this island in early 1812, he was attracted by the discovery of the ruin of a fort in the clutch of dense forest infested with tigers. Aided by a compass, Jones noted down the angles of "two complete bastions" which were "built with good brick and mud between the joints—the clay is excellent for that purpose".<sup>74</sup> Jones sent a rough plan of the fort and offered his services to clear the island at a very nominal cost to Robert Scott, Secretary of Marine Board. Scott was of the opinion that given the chance "Jones will succeed in clearing and settling the Island of Saugor, which would be of vast advantage to the commercial and shipping interests of the port (Calcutta)".<sup>75</sup> In a subsequent letter, Jones outlined in detail his plan of clearing the island. His novel proposal among other things includes some interesting observations about the intelligence of the Royal Bengal tigers. Jones wrote that he would try to avoid firing or making noise to drive the tigers away because the "animals will get accustomed to it".<sup>76</sup> He proposed to vary the mode of alarming the tigers "sometimes with Europe drums, and other methods, as well as shots."<sup>77</sup> Jones proposed to erect a dismountable

iron fencing to ensure safety of lives of the workers to be engaged in clearing the jungle. Every third day the fencing would require to be shifted and reerected for further operation. Jones requested the Government for a grant to clear and colonize the island at his own risk and expense. He wrote, "If I get this grant I bind myself to deliver it to Government, should they request it, any time within the span of ten years, by their paying me, twenty per cent advance upon my expenditure and also to let to Government any ground which they may want for public works at 1/8(?) per Bigah annually, *reserving to myself a proper portion of Beach for my own use.*"<sup>78</sup> (emphasis added).

Jones was looking forward to the establishment of a dry dock in this area and when his proposal found deaf ears, within a few months, we find him soliciting again in vain, for the purchase of 400 bighas of land from the Government for building a dry dock at Diamond Harbour.<sup>79</sup> The present day Haldia complex, some hundred kilometers away from Calcutta, has grown out of the problem of the silting of the river Hooghly. The argument for Haldia is not much different from what Jones was contemplating about Saugor Island or Diamond Harbour.

#### ARCHITECT

When Jones passed away in 1821, he was engaged as the architect and builder of the first Gothic edifice of India, Bishop's College in Shibpur.<sup>80</sup> It is more of a chance that the Bishop's College in course of time came to house the first engineering college in Bengal.<sup>81</sup> Bagging the assignment for construction of the College by a private engineer at that time was an achievement worth consideration. The possibility of a number of military engineers resenting the choice of Jones cannot be ruled out because in the late 18th and early 19th century it was the military engineers who enjoyed almost a monopoly of as architects and builders of the white town of Calcutta.<sup>82</sup> Other than Capt. (later Major General) W.N. Forbes, there was none from the fold of military engineers in India in the first two decades of the 19th century, who could stand a comparison with Jones as a steam age engineer cum architect. But Forbes assumed his importance after Jones' death with the introduction of steam boats in India and the establishment of the steam powered mint at Calcutta.<sup>83</sup> Incidentally, the second notable instance of Gothic architecture in Calcutta, the St. Paul's Cathedral was designed and built by Forbes.<sup>84</sup>

#### COLONIAL CONSTRAINT AND PARALLEL HISTORY

After Jones' death, John Draper, the executor to Jones' estate, made an appeal to the Government. He requested the Government to buy the works and buildings belonging to Jones at Shibpur so that a portion of Jones' debt could be settled.<sup>85</sup>

Draper's prayer went unheard.<sup>86</sup> Alexander & Company, however, settled Jones' debt to the Government on account of mining in 1824.<sup>87</sup> Jones' Shibpur complex was broken into a number of units and sold.<sup>88</sup> The canvas manufactory survived till about 1850 under supervision of an Indian agency.<sup>89</sup> Rustomjee, a noted businessman of Calcutta, purchased a portion of Jones' premises and converted it into a house for dying clothes. After its failure, Scott & Company took it over and ran a sugar factory. Ultimately it came in the possession of Ahmuty & Company (rum, biscuit, bakery and flour mill) which survived till the first decade of the present century.<sup>90</sup> Another portion of Jones' land was purchased by Motilal Seal who leased it to Apar & Company in 1849. They ran the Albion foundry for a number of years.<sup>91</sup>

East India Company's indifference to promote manufacturing and mining activities of the kind in which Jones was engaged brought ruin to his family after his death. He left a widow and three children. Decades later, in 1856, one of his children, Rupert Jones, presented a memorandum to the Governor of Bengal and sought his help in procuring any kind of an employment which could save him "from perishing through want of the actual necessities of life."<sup>92</sup> Rupert Jones was faced to leave school after his father's death and was sent to work with an indigo planter in Monghyr. After the failure of the indigo factory he was sustained by a series of odd jobs of temporary nature.<sup>94</sup> Rupert Jones must have thought that the Governor would be sympathetic to the tales of woe of a man whose father was the "discoverer of the first coal mine in India." Within a week he was informed that His Honour was unable in any way to comply with his request.<sup>95</sup>

Jones failed to fathom the commercial motivations of the Company and looked forward in vain for a patronage which eluded even the late 19th century non-national private engineering firms in India. As late as in 1880's most of the important engineering firms in India were practically controlled by Europeans but they did not have any easy time either. Firms like Jessop & Company and Burn & Company in Calcutta and Richardson & Cruddas in Bombay, although much more modest in outlook compared to Jones', and who would have been quite content with an access to grease the undercarriage of colonial locomotion, were agitating for a right to render for simpler types of structural works such as small spans of railway girders etc.<sup>96</sup> It is also worth recording that the domicile of the firm, Jessop & Company changed from India to England in 1901.<sup>97</sup> This was the firm which we have already noticed, was a contemporary of Jones and had their policies dictated primarily by the interest of their parent company in England.

It will not be out of context to further add that in 1896 most of the British businessmen joined the Indian millmade cotton piece goods manufacturers to

"countervail" a revenue duty on import of piece goods from abroad.<sup>98</sup> Obviously, the hostile atmosphere which thwarted Jones' efforts, did not change appreciably with the termination of Company's rule in India followed by that of the Crown. The Imperial Government's concern for even "selective" industrialization of India came only in the wake of the First Great War.<sup>99</sup> From an analysis by Bagchi it is clear why in the period from 1900 to 1939, interests of the British industrialists in India were subordinated to that of preserving the British Imperial order, meaning, maintenance of British-controlled gold standard, and the political apparatus of 'Pax Britannica'.<sup>100</sup>

The long time implication of this colonial constraint on transfer of modern technology down from the age of Jones assumed new significance with the emergence of the Indian industrial business houses. Dealing with the post-colonial period, Das Gupta, has quantitatively analyzed how the international control over technology was one of the determinants which subjugated national entrepreneurship to the pressure of foreign capital and control.<sup>101</sup>

If this discussion appears to be tinged with idolatrous tribute to Jones based on an imaginary future in non-colonial time-frame, Samuel Owen provides us with a glimpse of parallel history. Samuel Owen was an English engineer who emigrated to Sweden in early years of the 19th century and established a factory for manufacturing steam engines in Stockholm. Sweden was not an industrially developed nation in comparison with quite a few of the European countries till the First Great War. But Sweden, certainly, was an independent nation and that made the difference. The non-national Owen was successful in turning out "Swedish made' steam engines. Manufacture of steam engines also led Owen to designing and fabricating machine tools like the lathe.<sup>102</sup> However, colonialism, we must hasten to add, is only one of the many critical factors associated with the transfer of technology across national boundaries and here again Sweden offers an appropriate example. The first attempt for introducing steam power in Sweden for drainage of a mine was made in the first quarter of the 18th century but all efforts for building and operating the Newcomen engine was finally aborted by a verdict of law in 1736.<sup>103</sup>

#### NOT AN ICON BUT THE 'GURU'

British East India Company with its dominating mercantile interest was in no way concerned about projecting the engineers at work in India, outside the fold of militia, as "icons". But precisely this was done in their "homeland", where no one failed to acknowledge the role of engineers. Jones failed to reap benefit from his pioneering endeavour but as we have already noticed, in the area of coal mining at least, his ventures paved the way for his successors to attain commercial success.

The Company's mercantile policy took little interest in sharing the risks involved in the early years of mining and they had no qualm to leave it entirely in private hands. With the arrival of the steam boats and ultimately the railways, both the Company and later the Crown had occasions to repent about the opportunity they had lost in exercising state ownership of the mining industry in India.<sup>104</sup>

Jones' contribution in transfer of technology was best acknowledged by the local Indian artisans and mechanics when they honoured him as their *Guru*. About twenty three years after Jones' death, J.C. Marshman recorded how William was endearingly transformed into *Guru*, .....He was a perfect master of the native language, which he spoke with as much facility and accuracy as if he had been born in the country. He was thoroughly acquainted with the habits, customs and feelings of the natives, and was ever ready to assist those around him with his skill and advice, as well as his purse. He came therefore at length to be known as Goroo Jones, or the teacher Jones".<sup>105</sup> This again belies the presumptions of historians like Bernstein who believed that the advent of steam age technology in India spelled psychological crisis for the conquered.<sup>106</sup> Jones was not considered as a God by the local craftsmen and technicians but the *Guru*. The semiological implication of which is very simple. God works wonders but the *Guru* teaches the pupil to work wonders.

Speculations apart, the emergence of Howrah as the industrial suburb of Calcutta in the early 19th century can certainly be partly attributed to the seeds sown by Jones when he founded his industrial complex on a portion of land developed by himself.<sup>107</sup>

#### REFERENCES AND NOTES

1. George Basalla, *The Evolution of Technology* Cambridge, 1988, p.79.
2. Daniel R. Headrick, *The Tools of Empire* New York, 1981.
3. "Iron boats full of steam and fury may well have left an impression with unsophisticated villagers, adding to those which led some to look on the English as wonderworking people akin to the demigods of the Hindu pantheon. It would be impossible to measure precisely how much the British position in India rested on this point in the psychology of the people...If a young civil service cadet, fresh out of the East India College, Herfordshire, happened to be posted to a district along the Ganges, perhaps his connection with men who could make boats go by smoke and fire might have been an additional cause of inspiration he drew from Muslim and Hindu eyes", quoted from Henry T. Bernstein, *Steamboats on the Ganges* Calcutta, 1960, pp. 174-5; Michael Ades, *Machines as the Measure of Men*. New Delhi, 1990.
4. George Basalla *op.cit*, p. 129.
5. *Ibid.*, p. 131.

6. Narendra Krishna Sinha, *The Economic History of Bengal 1793 to 1848*, vol. III (Calcutta, 1970), pp.23-25.
7. *Ibid.*, p.13.
8. Amitabha Ghosh, "Introduction of Steamboats in India", *Bulletin of the Victoria Memorial*, vol. IX Calcutta, 1975, 32-44.
9. Henry T. Bernstein, *op.cit.*
10. West Bengal State Archives (henceforth referred as WBSA) Territorial Revenue Dept., Proceedings, 9 June 1825, no. 7.
11. Kathleen Blechynden, *Calcutta Past and Present*, reprint Calcutta, 1978, p. 147.
12. National Archives, Mint Committee Proceedings, 1807-11, 7 November, 1808, no. 20.
13. WBSA, Revenue Dept., 16 November 1821.
14. National Archives, Mint Committee Proceeding, Index of Subjects, 1804-5, pp. 111-2.
15. National Archives (n. 12 above), 8 October 1808, no. 20 and 7 November 1808, no. 25.
16. National Archives (n. 14 above), 1817-8, p. 131.
17. WBSA, Revenue Dept., 16 November 1821.
18. J.C. Marshman, "Notes on the Right Bank of the Hooghly", *Calcutta Review*, vol. IX Calcutta, July-December 1845, p. 478.
19. WBSA, Revenue Dept., 16 November, 1821.
20. J.C. Marshman *op.cit.*
21. WBSA, Revenue Dept., Proceedings, 16 November, 1821, no. 6.
22. Quoted in *Calcutta Gazette* (Calcutta, 8 March 1810). Two reports by the users of Jones rope and canvas were published in this paper along with the report. F.Pellew, Captain wrote, "It is infinitely superior to either Europe rope or any country rope I have seen, and is, in my opinion, fully equal to the Manila rope." The second report from Wm. Godfrey, Master and J. Barry, Boatswain of His Majesty's Ship *Phaeton*, noted, "It has already worn out Europe rope of double its size twice over...The canvas is extremely good, and in our opinion, fully equal or stronger than Europe canvas of a similar number".
23. J.C. Marshman *op.cit.* p. 479.
24. *Ibid.*

25. *Ibid.*
26. *Ibid.*
27. WBSA, Extract from the Proceedings of Military Dept., 2 April 1814. See also, Revenue Dept., Proceedings, 16 April 1814, no. 7.
28. WBSA, Revenue Dept., Proceedings, 16 April 1814, no. 7. Letter from C.W. Gardner to Mathew Smith, 5 March 1814.
29. *Ibid.*, Letter from Mathew Smith to C.W. Gardner, 14 March 1814.
30. *Ibid.*, Letter from W. Jones to Mathew Smith, 12 March 1814.
31. H.D.G. Humphreys, *History of the Bengal Coal Company*, microfilm of the Mss. of Andrew Yule & Co., Birla Industrial & Technological Museum, Calcutta. Humphreys writes, "Bowreah Cotton Mills began to operate on the outskirts of Calcutta using steam as motive power. Among other things the mills, before they closed in 1837 bought English girls to teach the Indian machine spinning techniques, but in a bustling city full of bachelors and sea-faring men, some at least of the ladies soon found their way to easier, if less virtuous means of earning livelihood."
32. WBSA, Revenue Dept., Proceedings, 16 April 1814, nos 8-9. Letters from W. Jones to G. Dodswell, Chief Secy., Govt. of Bengal, 4 and 15 April, 1814.
33. WBSA, Revenue Dept., Proceedings, 16 April 1814, no. 10 Letter from G. Dodswell to W.Jones, 16 April 1814.
34. WBSA, Revenue Dept., Proceedings, 16 April 1814, no. 9. Letter from W. Jones to G. Dodswell, 15 April 1814.
35. WBSA, Revenue Dept., Proceedings, 30 April 1814, no. 10.
36. WBSA, Revenue Dept., Proceedings, 16 June 1815, nos. 25-27.
37. William Jones, "Description of the North West Coal District", *Asiatic Researches*, vol. XVIII, Pt. 1 Calcutta, 1829, pp. 163-70.
38. *Ibid.*, p. 165.
39. H.D.G. Humphreys *op.cit.* writes, "In its early stages it consisted of 3 shafts within an area of a few hundred yards, each nine feet in diameter and sunk to nine feet seam of coal at a depth of about 88 feet".
40. *Ibid.*; see also, "Plan of the Colliery at Raniganj" incorporated with Jones article (n. 37 above), p. 171.
41. William Jones *op.cit.*, pp. 163-71.
42. WBSA, the Board of Revenue, Proceedings, 5 December 1817, No. 13; containing as an enclosure, a letter to W. Jones etc. 14 November 1817.

43. WBSA, Revenue Dept., Proceedings, 26 October 1821, nos. 20-21.
44. H.D.G. Humphreys *op.cit.*
45. Blair B. Kling, *Partner in Empire*, Calcutta, 1976, p.96.
46. L.J. Barraclough, "A Further Contribution to the History of the Development of the Coal Mining Industry in India", Mining, Geological and Metallurgical Institute of India, Transactions (Calcutta, April 1951), p.3
47. WBSA, Revenue Dept., Proceedings, 16 June, 1815, no. 25 Jones' letter to W.B. Bayley, Actg. Secy. to the Govt. of Bengal, dt. 18 April 1815.
48. *Ibid.*
49. *Ibid.* see also, H.D.G. Humphreys *op.cit.*
50. WBSA, Board of Customs, Salt and Opium, Proceedings, 9 March 1821, no. 1.
51. Blair B. Kling *op.cit.* p. 120. Alexander & Co. settled Jones' debts after his death and sold the Raniganj mine on mortgage to one Captain Stewart who worked it for a few years without commercial success. From 1824 Alexander & Co. began operating the mine on their own account. In January 1836, the mine was purchased by Dwarakanath Tagore of Carr, Tagore & Co. The Bengal Coal Company was formed in 1844 and Tagore was the first Managing Director.
52. H.D.G. Humphreys *op.cit.*
53. J. Homfray, "A Description of the Coal Field of the Damoodah Valley", *Journal of the Asiatic Society of Bengal*, vol. XI, pt. II Calcutta, 1842, p. 735.
54. WBSA, Marine Dept., Proceedings, 27 August 1844, no. 25.
55. Blair B. Kling *op.cit.* pp. 100-4.
56. H.D.G. Humphreys *op.cit.*
57. Quoted in Blair B. Kling *op.cit.* p. 97.
58. For an opposite example, when Indian cultural and social system was found responsible for abortive efforts in introducing silk filatures and cotton ginning machines India, see, Sabyasachi Bhattacharya, "Cultural and Social Constraints on Technological Innovation and Economic Development : Some Case Studies", *Indian Economic and Social History Review*, 3:3 (September 1968) : pp.240-61.
59. H.D.G. Humphreys *op.cit.*
60. Blair B. Kling *op.cit.* p. 95.
61. H.D.G. Humphreys *op.cit.*

62. Blair B. Kling *op.cit.* p.97.
63. WBSA, Board of Customs, Salt & Opium, Proceedings, 9 March 1821, no. 1.
64. J.H. Stocqueler, *The Handbook of India*, 3rd edition London, 1854, pp. 125, 174, 178.
65. WBSA, Judicial (Criminal) Dept., 15 April 1814, nos. 6, 15, 16.
66. WBSA, Territorial Revenue Dept., Proceedings, 6 May 1819, no. 17.
67. *Ibid.*
68. Jessop & Co. bagged the contract for erection of Engine House, installation of machinery and superintending its operation for the first six months for approximately Rs. 24,305. See, WBSA, Judicial (Criminal) Dept., Proceedings, 8 February 1822, nos. 3-4.
69. J.H. Stocqueler *op.cit.* p.125.
70. Amitabha Ghosh, "Golak Chandra : India's Pioneer Innovator Technician", *Indian Journal of History of Science*, 28(2), New Delhi, 1993.
71. WBSA, Board of Customs, Salt & Opium, Proceedings, 9 March 1821, No. 1.
72. *Ibid.*
73. George Smith, *Life of William Carey : Shoe Maker and Missionary* London, 1885, p. 183. For a description of the paper manufactory at Srirampur, formerly spelled as Serampore, see Amitabha Ghosh *op.cit.* and Sunil Kumar Chatterjee, *William Carey and Serampore* Calcutta, 1984, p.50.
74. WBSA, Revenue Dept., Proceedings, 16 March 1812, no. 13.
75. *Ibid.*, Letter from Robert Scott, 4 February 1812.
76. *Ibid.*, Letter from Jones to Robert Scott, 18 February 1812.
77. *Ibid.*
78. *Ibid.*
79. WBSA, Revenue Dept., Proceedings, September 1812, nos. 5, 9.
80. Bishop Middleton wrote that at the time of Jones' death the buildings were brought up to the level of the second storey, but more than half the masonry done. Middleton's admiration was expressed in a letter quoted by J.C. Marshman (n. 18 above), "It seems to be admitted that finer work was never seen in this country. The grand entrance to the Hall and Chapel, a Gothic arch seventeen feet high and ten wide, is finished on the south side, and very nearly so on the northern....The frames of the chapel windows are in, and the skeleton of the great eastern window, twenty three feet high, is, I hear, completed. It is something, that Jones lived to do so much.It will still be his monument." Also see, W.G. Forrest, *Cities of India* London, 1903, pp. 274-5.

81. The Civil Engineering College was established in 1856 and was at first housed in the Writers Building, Calcutta. In November 1864, the College was shifted to the campus of the Presidency College as its adjunct. The Bishop's College and its campus were acquired in 1880 and the Engineering College moved to the new site which it occupies to this day. See, Abani M. Bannerjee (ed.), *Bengal Engineering College Centenary Souvenir* Calcutta, 1956, pp. 7-22.
82. Of the still extant notable buildings, the architects and builders of St. John's Church (1787), the Government House (1802), the Asiatic Society (1808) and the Town Hall (1813) were respectively Lieutenant Agg of Bengal Engineers, Capt. Wyatt of Corps of Engineers and Colonel Garstin. See, H.E.A. Cotton, *Calcutta Old and New*, first published in 1904 Calcutta, 1980, pp. 385, 543, 594; *Centenary Review of the Asiatic Society of Bengal from 1784 to 1885*, vol. I Calcutta, 1885, p. 22
83. S.K. Ghosh, *Introduction and Development of the Electric Telegraph in India : A Case Study of its Technological, Economical, Social and Political Ramification*, Ph. D Thesis, Jadavpur University, Calcutta, 1974, p. 300.
84. H.E.A. Cotton *op.cit.* pp. 479-80.
85. WBSA, Territorial Revenue Dept., Proceedings, 16 November 1821, no. 6.
86. *Ibid.*, no. 7.
87. WBSA, Revenue Dept., Proceedings, 9 January 1824, no. 28.
88. WBSA, Territorial Revenue Dept., Proceedings, 16 November 1821, nos. 6-7.
89. C.R. Banerji, *An Account of Howrah Past and Present* Calcutta, 1872, p.80.
90. *Ibid.*, p.80.
91. *Ibid.*, p.81.
92. WBSA, General Dept., 26 June 1856, no. 94. Letter from Rupert Jones to H.J. Halliday, Lieut. Governor of Bengal, 19 June, 1856.
93. *Ibid.*
94. *Ibid.*
95. *Ibid.*
96. Amiya Kumar Bagchi, *Private Investment in India, 1990-1939* Calcutta, 1989, pp. 332-3.
97. *Ibid.*, footnote, p. 332.
98. *Ibid.*, p. 422.
99. *Ibid.*, pp. 78-85.

100. *Ibid.*, pp. 420-1.
101. Subhendu Dasgupta, *Linkages Between Organised Industry in India and Foreign Private Capital and Technology*, Doctoral Thesis, Calcutta University, unpublished, 1984, p. 22.
102. See exhibits in The Tekniska Museet, Stockholm, Sweden, One of Owen's Beam steam engine which was installed in Hoganas coal mine in 1832 is preserved in the Machinery Hall of the Museet. In the Engineering Workshop Hall is on display the lathe built by Owen when he was employed at Akers Styckebruk in Sodermanland.
103. Svante Lindqvist, *Technology on Trial* Uppsala University, 1984.
104. Blair B. Kling *op.cit.* pp. 100-1, 110-15.
105. J.C. Marshman *op.cit.* p. 480.
106. Blair B. Kling *op.cit.* Henry T. Bernstein *op.cit.* pp. 74-77.
107. J.C. Marshman *op.cit.* p. 480. See also, WBSA, Territorial Revenue Dept., Proceedings, 16 November 1821, no. 6, Letter from John Draper, Executor to Jones' estate to Marquis of Hastings, Governor General, dated 13 November 1821.