EMPIRE, SCIENCE AND NATURE : UNEARTHING THE COLONIAL ROOTS OF THE BOTANIC GARDEN OF CALCUTTA UNDER EAST INDIA COMPANY (1786-1858)

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Abstract

This paper examines the origin and early evolution of the botanic garden of Calcutta under the East India Company in the late eighteenth and the first half of the nineteenth centuries to bring to light the prominent role played by this colonial institution in the wider colonial scheme of the commercial exploitation of plant wealth across the British Empire and the introduction of economically-valuable tropical plants into British India. This is also an attempt to relook at the remarkable early history of one of the most prominent botanic gardens of the world in order to understand profound links that had intimately connected empire, science and nature during South Asia's colonial past.

Keywords: Botanic Garden, Calcutta, Colonialism, Exotic Plants, Plant Introduction

Introduction

The vestiges of the influential European presence in Bengal spanning across the last five centuries are mostly along the once thriving trade route of the river Hooghly. With its recorded history beginning in 1690 as an English factory (trading outpost) on the eastern bank of this river (with the older Portuguese, Dutch, Danish and French settlements on its opposite bank), Calcutta (now called Kolkata) was the firm foothold from where the British extended their domination across South Asia and which at the pinnacle of its power was the second city of the Empire. Presently, the more than two hundred year-old Indian Botanic Garden (lately rechristened as the Acharya Jagadish Chandra Bose Indian Botanic Garden), located across this river, in Shibpur, Howrah, is an island of serene greenery amidst one of the chaotic fringes of this bustling metropolis. However, deep beneath the pristine canopy of this spacious estate lay hidden are its murky roots from the colonial past.

During the European colonial expansion across the globe ca. from the sixteenth to the nineteenth centuries, botany developed into one of the foremost sciences of the West and became a potent tool for consolidating the European imperialism. Maritime voyages of discoveries from England, Spain, Portugal, France and the Netherlands to the Americas, the East and the West Indies were made in the pursuit of wealth from the rising commerce in tropical plant products that were to be extracted from their prospective overseas colonies (O'Donnell, 2010). Thus, competing trading interests, rather than the spirit of scientific enquiry, fuelled the worldwide rush in exploring and collecting exotic plants from the tropics and their taxonomic study during the sixteenth and seventeenth centuries. Thus, the growing territorial control of the European powers opened up the rich, exotic plant life of the newly acquired geographical areas not merely to the scrutiny of the rapidly expanding frontiers of scientific knowledge, but also rendered their natural wealth (and the subjugated native cultures who were sustainably using them) defenceless to the horrors of commercial exploitation (Browne, 1996). By the eighteenth century, the hunt for new useful plants from the tropics and their identification, nomenclature and classification became the leading edge of botany (Schiebinger, 2004). As colonial botanists helped the empire in extracting the plant capital from their overseas possessions by identifying, transporting and

acclimatizing novel plant species for their cultivation and trade, their botanic gardens evolved into logistic hubs that facilitated plant introduction at a global scale (Heywood, 2011). Thus, Richard Axelby aptly describes these "gardens of science" as the "nurseries of empire" (Axelby, 2008). This paper explores the early history of the botanic garden of Calcutta under the East India Company during the eighteenth-nineteenth century to study the role of its botanists in serving the British Empire by introducing commercially useful exotics into British India.

Methodology

The objective of this study was to study the origin and early development of the Indian Botanic Garden, Shibpur, Howrah, and delineate the relationship between botany and the exploitation of natural resources by the East India Company in British India. An exhaustive review of the primary and secondary literary sources provided the basis for this work. The primary literature includes scientific works, historic accounts, travelogues and letters from that period that were accessed at the National Library, Kolkata, as well as the libraries of the Indian Museum, the Asiatic Society, the Ramakrishna Mission Institute of Culture and the Botanical Survey of India, all in Kolkata, and electronically from the Royal Botanic Garden, Kew. The secondary literature including books and reviews about the history of this garden and about botanical science during the eighteenth-nineteenth century that were consulted for the background study and to contextualize the conclusions drawn from this assessment.

The Rich Colonial Legacy of the Botanic Garden

A Humble Beginning

In the late eighteenth century, Lieutenant-Colonel Robert Kyd of the Bengal Infantry, a Scottish military officer and amateur horticulturist, was the Secretary to the Department of Inspections at Fort William located on the eastern bank of the Hooghly in Calcutta. On fifteenth April, 1786, he first suggested to the Board of Directors of the East India Company the benevolent idea of establishing a

botanic garden near Calcutta as a source of alternative food during famine by cultivating the sago palm (Metroxylonsagu) from Malacca and the date palm (Phoenix dactylifera) from Persia (Biswas, 1950). Subsequently, on first June 1786, he again approached the Board with a more mercantile raison d'être of a botanic garden, not as a repository of rare curiosities, but as a repository of economically-useful plants offering botanical information and enabling horticultural experiments to promote the trade interests of the Company by surpassing its rivals, particularly the Dutch monopoly on the spice trade, with the introduction into British India of spices such as nutmeg (Myristicafragrans) and clove (Syzygiumaromaticum) from the Moluccas, cinnamon (Cinnamomumzeylanicum) from Ceylon, as well cash crops such as tobacco (Nicotianatabacum) and cotton (Gossypiumhirsutum) from the Americas, coffee (Coffeaarabica) from Arabia and tea (Theasinensis) from China (Biswas, 1950). On second August 1786, Kyd's proposal was finally recommended by the Governor General, Sir John Macpherson, to the Court of Directors of the Company in London (Axelby, 2008). The cultivation of the fine spices in their colonies, in contrast with the success of the French in introducing vanilla (Vanilla planifolia) from Mexico to the Jardin de la Compagnie on the Island of Réunion, was still eluding the Company. The botanic garden of St. Vincent (established in 1765) was already well-known as the acclimatization hub in the West Indies (Heywood, 2011). Thus, on thirty first July 1787, the East India Company finally decided to establish the proposed botanic garden near Calcutta and appointed Kyd as its honorary Superintendent (Hastings, 1986). Kyd was a dedicated horticulturist who at the Shalimar Point, located in the city's western suburbs on the opposite bank of the Hooghly, had a private riverfront mansion along with a garden of exotic plants (Sanyal, 1896). He used both public and private funds to build what was called the "Honourable Company's Botanic Garden" (or simply the "Company Bagan") at Shibpur (then called Shibpore), near the Shalimar Point, three miles downstream from the city (King, 1895). It was built on a large plot with an area of 310 acres and a mile-long riverfront. His own private property was separated from this new garden by a ditch (Blechynden, 1905). Kyd died in 1793, but his family refused to carry out his last wish of being laid to rest in his beloved botanic garden (Anonymous, 1851). After his death, his post was briefly managed by the Scottish surgeon and botanist, John Fleming (the first of an almost unbroken succession of nine Scottish botanist-physicians at the helm of

affairs of this botanic garden). A memorial urn dedicated to its founder, by the English sculptor, Thomas Banks, was put up in the centre of the garden in 1795, where it stands to this day.

A Brief Account of a Remarkable Past

By the turn of the century, this rather modest garden of exotic tropical plants was transformed into the greatest botanical institution in British India under its first salaried Superintendent, the Scottish surgeon and botanist, William Roxburgh. He had prepared a detailed catalogue of 1,510 exotic plants cultivated in the garden, the Hortus Bengalensis (1814). William Carey, the English missionary and amateur botanist who was his personal friend and later founded the Agricultural and Horticultural Society of India, in 1820, in the city's southern suburbs at Alipore (then called Allypore), wrote in his book The Good Old Days of Honourable John Company (1882) that it was due to Roxburgh's "eminent abilities as a botanist" that the recorded number of plants in this garden collected from across the East had increased from 300 to 3,500 during his tenure (Carey, 1882). It is of interest to note that till the publication of the Flora of British India (1872), the magnum opus of the English explorer and botanist, and the Director of the Royal Botanic Garden, Kew, Sir Joseph Dalton Hooker, the Flora Indica (1820-32) by Roxburgh (posthumously published by Carey, with the help of the incumbent at the botanic garden, Nathaniel Wallich, from his Baptist Mission Press in Serampore) was the most reliable botanical account of the native plants of South Asia (Roxburgh, 1820-32). Roxburgh laid the foundation of modern (post-Linnaean) plant taxonomy in India by establishing a herbarium, in 1795 (now called the Central National Herbarium which is one of the oldest and largest in the world), at his riverside quarter (the currently abandoned "Roxburgh House") built by him earlier that year at the site of the ruins of a pre-colonial military outpost called the Muckwah Thanna which was erected by the Mughal Governor of Bengal to control the menace of Portuguese and Arakanese buccaneers along the river Hooghly (Blechynden, 1905). Another of his invaluable legacy is the Icones Roxburghianae which is a large collection of original water colour paintings of Indian plants by native artists using vegetable dyes, and its first volume was posthumously published by the Botanical Survey of India, in 1964, wherein the foreword by the Spanish-born naturalized Indian botanist and its

Director, Hermenegild Santapau, describes it as "our effort to the memory of William Roxburgh, the 'Father of Indian Botany' [...]" (Roxburgh, 1964). On account of his ill health Roxburgh left India in 1813 for Edinburgh where he soon passed away in 1815 without fulfilling his wish to return to his beloved "Paradisus on the banks of the river Hooghly." The pillar erected in his memory by his friends in the garden next to the great banyan tree, in 1822, bears a Latin epitaph penned by the English explorer and clergyman, and the Lord Bishop of Calcutta, Reginald Heber (Anonymous, 1851). As a frequent visitor to the garden he described it as "not only a curious but a picturesque and most beautiful scene, and more perfectly answers Milton's idea of Paradise, except that it is on a dead flat instead of a hill, than anything I ever saw" (Subbarayalu, 2014). Roxburgh was succeeded by the Scottish physician and botanist, Francis Buchanan-Hamilton, for a brief period. Failing health also compelled him to return to Scotland in 1815. He was followed by the Danish surgeon and botanist, Nathaniel Wallich, first provisionally (1815) and then on a permanent appointment (1817). Earlier, in 1808, he became a prisoner of war when the East India Company captured the Danish settlement of Serampore, then known as Frederiksnagore, but was granted parole in 1809 on account of his scholarship and appointed as an assistant to Roxburgh. He soon gained the trust of the Company with his dedicated services that notably included the first honorary Curator and Superintendent of the Oriental Museum of the Asiatic Society (later renamed as the Indian Museum), established in 1814 in the centre of Calcutta by the Welsh jurist and philologist, Sir William Jones. During his prolonged tenure, the botanic garden became an elegant public space for the instruction and leisure of the growing European population of Calcutta (Axelby, 2008). In 1828 he transferred the entire collection of the garden's well-stocked herbarium to London. However, he is credited with the preparation of a list of more than 20,000 plant specimens from India known as the "Wallichian Catalogue." These were collected by Wallich himself and by other colonial botanists. Earlier, in 1820, he had donated 40 acres of the garden's land to the first Lord Bishop of Calcutta, Thomas Fanshawe Middleton, to establish the Bishop's College (which was later relocated to the city in 1879 and the Bengal Engineering College was shifted here in 1880). In 1842, on account of his failing health, Wallich visited South Africa. Despite his strong opposition, his long-standing personal rival, the English surgeon and botanist, William Griffith, was handed the charge of the botanic garden. Griffith

initiated the ambitious reorganization of its landscape (a colossal task that was ultimately completed much later during the tenure of the Scottish surgeon and botanist, George King, during the first centenary of the garden). Thus, in his own words they "are now for the first time […] in some measure gardens of science and instruction" (Axelby, 2008). Wallich returned in 1844, and Griffith when relieved returned to the Straits of Malacca where he fell ill and died in 1845. Persistent poor health also forced Wallich to resign in 1846 and return to London (where he lived till his death in 1854). The Scottish physician and naturalist, Sir John McClelland, briefly took the charge of the garden. He was succeeded by the Scottish medic and botanist, Hugh Falconer, and then by the Scottish surgeon and botanist, Thomas Thomson. It was during Thomson's term, in 1858, the powers of the East India Company were transferred to the British Crown and the botanic garden was later rechristened to be as the "Royal Botanic Garden" (till 1950 when India became a republic and the epithet "Indian" replaced the "Royal"). Earlier, in 1848, when the J.D. Hooker, whose father Sir William Jackson Hooker was the Director of the Royal Botanic Garden, Kew, visited this garden which was known as the "Kew of India" he writes that it had "contributed more useful and ornamental tropical plants to the public and private gardens of the world than any other establishment before or since" (Hooker, 1854). On the strong foundation built these botanists appointed by the East India Company, by the late nineteenth century the Royal Botanic Garden of Calcutta became the greatest colonial botanic gardens of the world (Thomas, 2006).

The Outstanding Plant Collectors of the Botanic Garden

Robert Kyd who founded the Garden

The Honourable Company's Botanic Garden was established on the outskirts of the capital city of the "Jewel in the Crown" of the British Empire at a time of increasing anxiety in London about the French success in introducing useful plants into their colonies (Armytage, 1965). The plot itself, where this garden stands, was the site of a failed plantation experiment of teak (Tectonagrandis) for supplying timber to the shipyards of Howrah (then called Howra) located in its vicinity (Blechynden, 1905). Its founder, Robert Kyd, envisioned this garden not

simply for recreational, but mostly for utilitarian purposes as a part of the wider pursuit of scientific knowledge. Earlier, as a young military officer posted at the eastern frontiers of British India, he had pioneered plant collection in the Eastern Himalayas (Grove, 1995). In 1776, he collected saplings of a local species of cinnamon from the forests of Assam. Soon he acquired another species from Bhutan. Finally, the true cinnamon (Cinnamomumzeylanicum) arrived from Ceylon. These plants thrived well in the garden of the then Governor General, Warren Hastings, at Alipore, thus successfully introduced them into Bengal (Blechynden, 1905). In his new botanic garden, Kyd initially wanted to grow exotics such as hardwood trees like a plantation for supplying timber for the navy, as well as cash crops and fruit-yielding trees like a nursery for introducing them into British India for export (Armytage, 1965). On his advice, in 1787, the Government of Bengal requested the Governors of the other British Presidencies viz. Madras and Bombay, as well as the British Residents in the East such as at Mocha (Arabia), Basra (Mesopotamia), Peking (China), Penang (Malacca), Bencoolen (Sumatra) and the Moluccas (Indian Ocean), for despatching a wide range of tropical plants. In a letter dated third October 1787, the British Resident at Basra (or Bussora), Samuel Manesty, forwarded his request for date palms to Edward Galley, the British Resident at Bushire in Persia. In May, 1787, Kyd received the first donation to his botanical garden in the form of a mango tree and a banana tree from "Colonel Pearse […] thro' the means of Lieutenant Cox" (Royal Botanic Gardens, Kew, 2006). Many others soon followed. Although he received support from the English explorer and botanist, Sir Joseph Banks (the honorary Director of the Royal Botanic Garden, Kew), his efforts in developing the garden were plagued by problems such as damage from a hurricane, shortage of skilled labour, but above all the poor response of British officials in Bombay, Bencoolen and China who failed to supply most of the plants that Kyd had sought (Royal Botanic Gardens, Kew, 2006). In the beginning, nutmeg, clove, cinnamon from Southeast Asia and black pepper (Piper nigrum) from South India failed due to unfavourable climate. Next, tropical fruit trees such as mangosteen (Garciniamangostana) from the Moluccas, breadfruit (Artocarpusaltilis) from Polynesia and jackfruit (Artocarpusheterophyllus) from South India, and temperate ones such as pear (Pyruscommunis), plum (Prunusdomestica), apple (Malussylvestris), grape (Vitisvinifera) and others from Europe, also met the same fate. He achieved some success in growing teak, but the local environment

caused the base of the trunks to turn hollow at an early stage thus rendering them useless as a source of timber (Sanyal, 1896). In 1793, Lord Macartney's mission to China managed to procure tea seeds from Canton that were dispatched to Calcutta. Lord Hastings, on the advice of Banks, sent them to Kyd to grow them in his botanic garden but the tea bushes failed due to the unfavourable climate (Ukers, 1935). However, he successfully acclimatized the Malayan tree called gomatoo (Arengapinnata) as the source of rope-yarn for the navy (Kumar, 2011). His magnanimous ideas of introducing sago and date for the famine-prone villages of Bengal never materialized. Instead, the garden was used to grow spices and other commercially worthwhile plants (Baber, 1996). Thus, the rhetoric of humanitarian and scientific endeavour was only a mask for the commercial designs of the colonial administrators in creating this botanic garden. In 1790, Robert Kyd and his botanic garden in Calcutta was part of the wider network of botanic gardens of the British Empire across the tropics (Grove, 1995). In 1793, by the time of his death, Kyd successfully introduced more than 300 such species in his new botanic garden (Roxburgh, 1814).

William Roxburgh who initially transformed the Garden

The first salaried Superintendent of the botanic garden, unlike his processor, was a trained botanist. Since 1781, in the Madras Presidency, he had studied the Carnatic flora (with the German physician and botanist, Johann Gerhard König, who was a pupil of Carolus Linnaeus) when he was the Superintendent of the Company's garden at Samalkot (then known as Samulcotah), a remote horticultural station for acclimatizing economic plants that was located about twenty two miles from the estuary of the river Godavari in the Northern Circars (the coastal belt of modern Andhra Pradesh). In 1786, he discovered black pepper in the hills of the Rajamundry Circar. In 1787, using 500 saplings from the Rampa hills, he raised nearly 40,000 pepper vines in his garden (Love, 1913). He also successfully introduced nutmeg, clove, cinnamon, coffee, jackfruit and breadfruit in his pepper plantations. In the lowlands of the Circars he introduced teak and recommended it to Robert Kyd in Calcutta (Royle, 1840). He was also able to cultivate cash crops such as indigo (Indigoferatinctoria) and sugarcane (Saccharumofficinarum) from other parts of India (King, 1895). At the end of the eighteenth century, the Company tried to establish the manufacturing of

cochineal dye in India, a Spanish monopoly in the Americas. Roxburgh helped the Company by experimenting with the cultivation of several exotic species of Opuntia, the host for the dye-yielding cochineal insect (Kelley, 2012). Armed with this vast experience, on twenty ninth November 1793, Roxburgh joined the botanic garden of Calcutta. In September 1794, Christopher Smith, the new appointee as the garden's Nurseryman recommended by Banks, arrived in Calcutta (along with Peter Good, a Kew gardener) and they brought with them a large consignment of plants from the Royal Botanic Garden, many of which were new to Bengal (Royal Botanic Gardens, Kew, 2006). Roxburgh initiated a systematic collection of plants from India, Southeast Asia, and the Far East. However, unlike Kyd, he adopted a more direct approach with the foresight to take advantage of Britain's maritime successes. During the brief British occupation of the Moluccas from 1795 to 1802, Roxburgh sent Smith on a collecting expedition to Amboyna in 1795. By 1797, he established a steady supply of plants from the Spice Isles to Calcutta and Madras (Mackay, 1944). In the same year the British also captured the Cape Colony. In 1797, when Lieutenant John Owen was sent here on a military mission, Roxburgh communicated with him with the request to collect interesting plants, flowers, bulbs or seeds and send them to Calcutta. Roxburgh himself visited the Cape of Good Hope from April 1798, to July 1799, to collect plants. When he sailed for Europe, he left his son John Roxburgh (a gifted plant collector and botanist) at the Cape to continue collecting plants for the botanic garden of Calcutta (McAleer, 2016). The junior Roxburgh was later sent to Rajmahal (1800), Chittagong (1801-02), Penang (1802) and Sumatra (1803) by his father on plant collecting expeditions (Desmond and Ellwood, 1994). In 1799, when the senior Roxburgh returned from abroad, teak was reintroduced in the botanic garden and soon several thousand young trees were ready for distribution. However, its plantations failed in most parts of Bengal. He is also credited with the successful introduction of the mahogany (Swieteniamahagoni) tree into this garden from seeds sent by the Court of Directors in 1795 from Jamaica in the West Indies. From only two saplings the stock was increased to about 500 trees by 1804 from which plantations flourished at several places in the Bengal Presidency (Browne, 1846). He also successfully initiated experiments with the cultivation of various fibrous plants, including the introduction of hemp (Cannabis sativa) and flax (Linumusitatissimum) from Europe, and Madras hemp (Crotalaria juncea) which is native to South India.

Roxburgh's nurseries were now so prolific that he was propagating more plants than he could distribute in a season. Therefore, the garden was enlarged in 1805 as the principle centre for acclimatizing exotics for introducing them to agriculture in British India. Other important plants introduced here during his tenure were soybean (Glycine max), nutmeg and clove from the Moluccas, cinnamon from Ceylon, camphor (Cinnamomumcamphora) from the Cape of Good Hope and gum-benjamin (Styraxbenzoin) from Sumatra (Royle, 1840). He continued the propagation and distribution of seedlings of teak, hemp, tobacco, coffee and indigo for trial cultivation across British India. As early as in 1810, he discovered the botanical source of India rubber or caoutchouc (Ficuselastica) from the eastern frontier of British India, and its water proofing qualities (Majumdar, 2016). Roxburgh himself enumerated 1,510 exotic plants in the botanic garden (Roxburgh, 1814). However, a later account states that the number of plants in this garden had increased to 3,500 during his twenty year-long tenure (Carey, 1882).

Nathaniel Wallich who further developed the Garden

The longest serving incumbent of this botanic garden, Nathaniel Wallich, was also a skilled botanist. He tried to continue the garden's role in the naturalization of useful exotics. Throughout his long career Wallich diligently pursued (and dispensed) patronage (Arnold, 2008). Thus, he made close friends as well as bitter foes (Axelby, 2008). Although he was well-connected with his powerful political masters in Calcutta and the influential scientific peers in London, however he, unlike Roxburgh, did not enjoyed much autonomy in articulating the policies of the garden. Now, the Agricultural and Horticultural Society of India was being official encouraged to facilitate the introduction of new plants and European farming technology into Indian agriculture. Wallich provided a large plot in the garden to the Society for its experimental work in naturalizing useful exotics such as India rubber from Nepal and Burma, cotton from North America, Manila hemp (Musa textilis) from the Philippines, and even superior breeds of sugarcane from Mauritius and the West Indies, to name a few (Anonymous, 1936). The botanic garden now became more engaged with its scientific mandate of documenting the plant wealth of South and Southeast Asia. The need to understanding in order to administer had already unleashed the enormous task of documentation, collection and categorization across British India. Wallich spent much of tenure

surveying the flora of new unchartered territories. He organized plant collecting expeditions in the northern and eastern frontiers of British India, as well as the neighbouring kingdom of Nepal (1820), as well as Malaya (1822) and Burma (1826-27) in Southeast Asia. He also used the garden to encourage interest in Western-style gardening by freely distributed horticultural plants. In the 1830s, he intimately involved the garden with the introduction of tea-growing in India. During his visit to London (1828-32) made a note of observations on the feasibility of commercial tea cultivation in the Himalayas. When Britain lost her monopoly over import of tea from China, and after his return to India, Wallich was nominated as the botanist by the Governor General, Lord William Bentinck, to the first Tea Committee, in 1834. In 1835-36 he led its scientific expedition to Upper Assam with a team that included William Griffith and Sir John McClelland. Wallich favoured the Himalayas for growing the "true" tea plants imported from China, but Griffith and McClelland argued that with the indigenous wild tea trees (Camellia sinensis var. assamica) growing in Assam were good enough for tea cultivation, thus negating any need for importing tea bushes from China. Initially influenced by the discovery of the indigenous tea plants, the Secretary of the Tea Committee, George James Gordon of the Mackintosh& Co. who was sent to China in 1834, was recalled in 1835 (Ukers, 1935). Moreover, ten years ago, in 1824, as the head of the botanic garden of Calcutta, Wallich had received specimens of these tea plant (discovered earlier in Upper Assam by Major Robert Bruce, in 1823) for identification from David Scott, the then Agent of the Governor General in the whole Eastern Frontier. He had committed a historical oversight by failing to identifying this as tea and thus delaying the commencement of commercial tea cultivation in India by a decade (Griffiths, 1967). Finally, in 1836, the Tea Committee decided that "authentic" tea plants from China, rather than "degenerate" ones from Assam, would be used in tea growing experiments in British India. In the same year, Gordon was once again sent to China. He sent tea seeds to Calcutta from which 42,000 shrubs were raised in the botanic garden and these were despatched to Assam, Kumaon and the Nilgiris (Ukers, 1935). Wallich, an avid plant collector, mentions in an application for leave: "My harvest far exceeds that reaped by any travelling naturalist or any party of naturalists during a corresponding period of time" (Desmond, 1992). However, his expeditions from 1817 to 1828 enriched the herbarium more than the nursery of his botanic

garden. Furthermore, unlike Kyd and Roxburgh before him, he also collected new plant species from the corners of India and even beyond and acclimatized them in the botanic garden of Calcutta and shipped them to Europe and elsewhere. Near the end of his tenure, in 1839-40, he was instrumental in introducing the Assam tea into Ceylon for its commercial cultivation by sending the seeds from plants growing in the botanic garden of Calcutta to the hills of Candy. His plant collections, disseminated across the world, indicate how well he used his expeditions for collecting plants for gardens, herbaria and museums (Maitra, 2014). As earlier as in 1828, he declared that the stock of the botanic garden had doubled during his tenure to 6,000 plants (Harrison, 2011).

The Botanists during the Final Years of the Company

Sir John McClelland (an associate of Griffith), Hugh Falconer (a protégé of Wallich) and Thomas Thomson (a personal friend of J.D. Hooker) led this garden through the last days of the Company's rule in British India. Earlier, when Wallich was on sick leave, his rival, William Griffith, temporarily held his post for a brief period. Described as "a man of genius," this young plant explorer, over a period of 13 years, made tours of botanical discovery "from the banks of the Helmund and Oxus to the Straits of Malacca," often as part of the military campaigns of the Company as in Afghanistan and Burma (Noltie, 2007). Three plans of the garden from 1816, 43 and 46 during the reordering of its landscape bear testimony to their personal enmity that originated in feuds during their plant explorations in Assam in 1835-36 (Alexby, 2008). The role of the garden in the tea saga started by Wallich continued. Falconer, influenced by Wallich, explored and surveyed the hills of Darjeeling (which the Company had annexed from the Kingdom of Sikkim after the Himalayan exploits of J.D. Hooker during 1848-50) for its suitability for tea cultivation (Rose, 2009). It was during this period that the Scottish botanist and plant hunter, Robert Fortune, was employed by the Tea Committee and sent incognito to China (1848-51) in search of tea (Ukers, 1935). He was successful in smuggling out the Chinese tea plant and brought them from Hong Kong and finally shipped them to India. In 1851, he arrived in Calcutta with 2,000 saplings, 17,000 germinated seeds as well as a few Chinese tea cultivators. The surviving 1,000 plants were naturalized in the botanic garden in Calcutta and Saharanpur to initiate tea plantations in the hills of

Darjeeling (Fortune, 1852). The story of cinchona began during the end of the Company's rule. In 1852, Falconer first suggested the procurement of cinchona (Cinchona calisaya) seeds and saplings of wild plants from the mountains of South America (and Falconer's idea that was later reiterated by his successors Thomson in 1854 and Anderson in 1860). In the meantime cinchona seeds collected during a French expedition in South America were sent from London to Calcutta, but they failed to germinate. However, six plants raised from them in Kew were brought to Calcutta, in 1853, by Fortune on his later voyage to China. They thrived in this botanic garden but all of them died when transferred to Darjeeling (King, 1880). The English geographer and explorer, Sir Clements Robert Markham, sent as the British Agent to South America (1859-61), used guile and deception to ship out cinchona (Cinchona succirubra) seeds from the Peruvian Andes to India (Markham, 1880). The plants reached the botanic garden of Ootacamund in the Nilgiris where they thrived (King, 1880). Later, in 1861, Thomas Anderson, the incumbent at the rechristened Royal Botanic Garden of Calcutta received cinchona seeds from W.J. Hooker from which thirty one saplings were raised. In the same year the Government of India sent him to Java (in the Dutch East Indies) to study the propagation of cinchona for establishing plantations in India. He returned to India with 412 cinchona plants and its seeds. He soon visited the botanic garden of Ootacamund and brought back 193 plants of C. succirubra in exchange for the C. calisaya from Java. By 1862, more than 280 cinchona plants existed in the garden. Anderson is credited with establishing plantations of this species in Sikkim and Darjeeling (King, 1880). Thus, tea and cinchona were the noteworthy contributions of the botanic garden of Calcutta in the introduction of valuable exotics into British India during the concluding years of the East India Company.

Conclusion

After Europe began to revive her classical learning during the Renaissance, the modern disciplines of science soon emerged as a potent tool for expanding her colonies across the seas at the expense of those the Europeans encountered (Harding, 1991). Thus empire and science developed a form of mutualism in the eighteenth and nineteenth centuries: empire patronized scientific endeavours,

and science facilitated imperial expansions. This close interrelationship between empire and science resulted in the evolution of "natural philosophy" into the highly specialized sciences that shifted towards the empiricism of direct observation. The scientific study of plants became abstracted away from their wider ecological and social contexts to create a hierarchy of knowledge in which traditional knowledge and skills were subordinated to the modern science and technology of the West (in which the colonies frequently lagged behind the metropolis). The practices of this utilitarian science promoted the idea of the racial, cultural and technological superiority of Europe to justify her hegemony across the globe. Earlier, from its ancient origins in herbalism and the dependence on medicine, botany had emerged as an independent science in the West. Their earliest botanic gardens were the physic gardens of Italy from the sixteenth century. The first recorded botanic garden (and herbarium) was established in 1543 in the University of Pisa by the Italian physician and naturalist, Luca Ghini. These gardens changed radically during the seventeenth and eighteenth centuries with the colonial conquest of the tropics, the botanical explorations in these new territories and the global trade in tropical plant products as food, fibre, drugs and luxury items for the domestic consumption in the empires (Schiebinger, 2004). In the eighteenth century, the Swedish physician and botanist, Carolus Linnaeus, widely accepted as the "Father of Modern Botany," fostered this colonial enterprise with his new system of naming and classifying plants (Pratt, 1992). Botanic gardens began to be widely established during the eighteenth and nineteenth centuries in Europe and her colonies to identify, introduce tropical plants from the "New World" as sources of cheap raw materials for the emerging industrial revolution in Europe (Schiebinger, 2004).

This review of the establishment and initial development of the botanic garden of Calcutta under the East India Company clearly illuminates its underlying policy of encouraging botany as a modern science for its material gains as a potent tool for occupying, administering and exploiting the plant wealth of its colonial possessions. Thus, in a global environment of widespread bioprospecting by colonial botanists for the state for the commercial exploitation of the plant resources in their overseas territories, this new botanic garden of Calcutta, strategically located near a trading port and the administrative hub of British India, was developed by a succession of eminent botanists who were patronized by the Company to introduce and acclimatize economically-useful exotic plants

that were collected, identified and transported from abroad, as well as from the remote corners of India, for commercial cultivation and profitable export using the cheap labour and fertile terrains of South Asia. The early history of this key scientific institution of the British Empire indicates that under the supervision of its colonial botanists this botanic garden soon developed into the focal point for plant exchange, mostly plant introduction, in British India, and therefore it became a rich repository of tropical exotics. This study also reveals the nurturing of this botanic garden in the hands of adroit plant collectors who devotedly served the commercial interests of the empire with their scientific endeavours, often serving as a façade for ecological espionage and political manoeuvre, of exploring the natural wealth of the tropics in their relentless quest for new commercially-useful plants as capital resources needed to sustain the colonial state apparatus and promote its trade interest. This brings to light the often overlooked nexus between empire, science and nature during the colonial past that resulted in the formation of an impressive, yet exploitative, network across the globe that enabled plant species to rapidly traverse the great distances across oceans and continents during a period of the early history of globalization that has been described as "proto-globalization" (Bayly, 2002).

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