

## Notes for a Study on the Early Scientific Work of the Asiatic Society of Bengal\*

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### I. Introduction

India, among the major Asian societies, experienced the most intense, varied, and prolonged contact with Europe from the 16th through the 19th centuries. Yet, with notable exceptions, few Indians seem to have taken Western science seriously prior to the middle of the 19th century. This situation was probably due in part both to the manner in which the various groups of Europeans intruded themselves into the subcontinent, and to the social and political conditions which prevailed there and in Europe when these several intrusions occurred.

The Portuguese, who began to establish their enclaves on the West coast of India in the last decade of the 15th century, were primarily interested in trade and in Christianizing the local population. During the following century the Moghul Empire became the dominant political power in North India. Akbar the Great received the first of three Portuguese Jesuit missions at his court in 1580.<sup>1</sup> Although Antonio Monserrate, the leader of the first two of these missions, wrote detailed accounts of his impressions of the Court and of his conversations with Akbar, there is no evidence that the emperor was either aware of or interested in developments in European science. The pragmatic, heterodox Akbar eagerly sought new ideas regardless of their origins. However, the Portuguese Jesuits (whose first mission to Akbar occurred twenty nine years before Galileo published his first telescopic discoveries) would probably have been neither equipped nor motivated to tutor the emperor in Western science. For his part Akbar, whose reign marked the zenith of Moghul power, would probably not have felt from his contact with these Jesuits that Europe had anything tangible to offer his empire.

The French Jesuits who established their missions in the French enclaves at Chandernagor and Pondicherry during the mid-17th century would have been

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<sup>1</sup> See, e.g., Maclagan, Edward. *The Jesuits and the Great Moghul*, London: Burns, Oates and Washbourne, Ltd., 1932, p. 23-68. Hosten, H. "Mongolicae Legationis Commentarius, or the First Jesuit Mission to Akbar by Fr. Anthony Monseratte, S. J." *Memoirs of the Asiatic Society of Bengal*, III, #9, pp. 513-704 (1914).

much better equipped to transmit Western science to India. Indeed, several of them such as Duchamp, Gargam, and Calmette began serious investigations of Tamil astronomy at Pondicherry, in South India;<sup>2</sup> while Boudier carried out a number of telescopic observations at Chandernagor in French Bengal, and in 1734 traveled to Amber at the invitation of the Raja Sawai Jai Singh II who sought his assistance in his astronomical efforts.<sup>3</sup> However, there was no ruler in South India during the 18th century who would have felt secure enough to have accepted and used the scientific insights which the Jesuits had to offer; while Boudier, for reasons that are not completely clear, failed to impress Jai Singh with the virtues of contemporary European advances in theoretical and observational astronomy.<sup>4</sup>

The first sustained contacts between Europeans and Indians occurred as the British East India Company began to assume administrative responsibilities in India, particularly in Bengal, during the latter years of the 18th century. Sir Thomas Roe, the first accredited ambassador to the Moghul court from Great Britain, presented his credentials to the Emperor Jehangir in 1616. But Jehangir, like his father Akbar, must have felt secure in his power, and seems not to have taken this representative of a distant commercial nation very seriously.

But the political situation in North India had altered significantly by the latter half of the 18th century. The Moghul power was collapsing, and the writ of Delhi scarcely applied in its distant and fruitful province of Bengal. The East India Company had become the official tax collector for the Moghul Emperor in Bengal and Bihar, and, as the authority of the empire continued to evaporate, established its own governmental and administrative apparatus throughout the provinces. By a 1774 act of Parliament, the Governor of the Company in Bengal was designated Governor General and given precedent over the Governors of the Presidencies of Madras and Bombay. Thus Calcutta became in effect the capital of British India, and the British residents began to establish colonial versions of their own institutions in the city and the province.<sup>5</sup> Indians in Bengal could

<sup>2</sup> Letters of M. Gargam, F. Duchamp, P. Calmette to Etienne Souciet of the College of St. Louis in Paris; Archives des Jésuites de la Province de Paris; Chantilly; Fonds Brotier; vols. 82, 83, 84, 88 and 89.

<sup>3</sup> Claude Boudier's observing book and three letters to Etienne Souciet; Archives des Jésuites de la Province de Paris; Chantilly; Fonds Brotier; vol. 78; vol. 88. ff 125-27; 133-35; 143-46.

<sup>4</sup> Claude Boudier and Pierre Pons recorded latitude and longitude observations at various places on their journey to Amber (ref. 3). Although Boudier reports his "observations of Jupiter's satellites with a 20-foot telescope" at the site of Jai Singh's observatory at Jaipur, there is no evidence that the Raja was interested in their telescope. Boudier and Pons are alleged to have expended considerable good will at the Raja's observatory by disputing the relative antiquity of Greek and Hindu astronomy with his Brahman observers. (MacLagen, *op. cit.*, ref. 1, pp. 134-35).

<sup>5</sup> For a review of political developments in North India and particularly in Bengal through the mid-18th century see Dodwell, H. H. (Ed.), *Cambridge History of India*, volume 5, Cambridge University Press, 1929, p. 141-203.

now regard the Europeans not as lone supplicants before a throne as Akbar and Jehangir had regarded them, but as the representatives of a distant, "modern" power which determined their destinies and whose institutions might be imitated with profit.

Since it was the policy of the East India Company to exclude non-official Europeans from its territories until well into the 19th century, Western science and education were of necessity introduced into India almost exclusively by British civil, commercial, and military officials. Thus it might be expected that the character of the science introduced during this period would mirror the changing policy of the colonial administration as well as the changing image of science held by the British residents in India. These residents and their institutions supplied the model (or models) for Indians who sought to Westernize themselves and their country.

The first European learned society to which such Indians were exposed was the Asiatick Society, renamed the Asiatic Society of Bengal after the founding of the Royal Asiatic Society of Great Britain and Ireland in 1826. Though founded and operated as a learned society of amateurs on the model of the Royal Society at London, the Asiatick Society had a considerable influence on the development of science policy in British India. Governors General were always patrons and often presidents. Virtually all the leading people in the official scientific departments established during the late 18th and early 19th century such as the Geographical, Geological, Botanical and Zoological Surveys were members.<sup>6</sup> Indeed, these departments often institutionalized earlier work carried out privately by Society members. Many of the plans for the programs carried out by these official surveys, as well as the preliminary results of these programs, were aired at meetings of the Society or in the pages of its journals. Such activities were consistent with the conviction of Sir William Jones, the founder and first president of the Society, that "the natural productions of these territories, especially in the vegetable and mineral systems, are momentous objects of research to an imperial, but what is a character of equal dignity, a commercial people."<sup>7</sup>

## II. Warren Hastings, William Jones, and the Founding of the Society

The Asiatick Society was founded at Calcutta in 1784, twenty-seven years after the Battle of Plassey had established the British as the primary European power in Bengal and throughout the Indian subcontinent, and the same year in which William Pitt carried his India Bill through Parliament.<sup>8</sup> During the latter

<sup>6</sup> Membership lists of the Asiatick Society are given in successive volumes of *Asiatick Researches* and in Mitra, Rajendralala, *Centenary Review of the Asiatic Society of Bengal*, Part I, Calcutta: Asiatic Society, 1885, pp. 83-94. See also Bose, P. N., *ibid.*, Part III, pp. i-lxxxviii.

<sup>7</sup> Jones, Sir William, "Second Anniversary Discourse" (Delivered to the Asiatick Society, 1785). *Asiatick Researches*, vol. I, 1788, pp. 407-408.

<sup>8</sup> Dodwell, H. H., *op. cit.* (ref. 5), pp. 157-64.

half of this twenty-seven year period the dominant figure in British India was Warren Hastings, who had served as Governor of Bengal since 1772, and Governor General with precedence over the governments of Madras [Fort St. George], and Bombay as well since 1774. Hastings was among the first of the high East India Company officers to realize that the Company had acquired governing responsibilities in India that went far beyond the commercial role it had been playing since it was chartered in 1600 by Elizabeth I. In his largely successful efforts to curb the worst practices of the Company's traders, and to give a measure of civil responsibility to qualified Indians, he frequently had to battle against both the Court of Directors in London and a majority of his own Council in Calcutta. Upon his retirement as Governor General in 1785 he was compelled to answer to impeachment charges for alleged misconduct during his term of office brought against him by a Parliamentary group headed by Edmund Burke. After protracted hearings he was completely exonerated, and lived to see himself regarded as a respected elder statesman whose advice was frequently sought on Indian affairs.<sup>9</sup>

Hastings himself was a fair Orientalist, and before his appointment as Governor of Bengal had sought vainly to have a Chair of Persian Studies established at Oxford.<sup>10</sup> His correspondence suggests a considerable degree of respect for the ability of the Indians,<sup>11</sup> though he could be high-handed when crossed by a local ruler.<sup>12</sup> Indeed, the basis of a good deal of his policy as well as that of his more prominent immediate successors, such as Lord Charles Cornwallis and Richard Marquis Wellesley, might be characterized as being one of benign

<sup>9</sup> For a review of Hastings' administration in Bengal see, e.g., Dodwell, *op. cit.*, (ref. 5), pp. 205-47; Forrest, G. W., *The Administration of Warren Hastings, 1772-85: Reviewed and Illustrated from Original Documents*, Calcutta: Superintendent of Government Documents, 1892. Details relative to the impeachment of Hastings are given in Dodwell, pp. 307-312, and by Marshall, Peter J., *The Impeachment of Warren Hastings*, Oxford University Press, 1965.

<sup>10</sup> Commentary of Warren Hastings on Lord Wellesley's College at Ft. William dated 19 July 1801, British Museum Additional Manuscript 29, 234; folio 136.

<sup>11</sup> In a letter to Lord Moira on the occasion of the latter's appointment as Governor General Hastings wrote: "Among the natives of India, there are men of as strong intellect, as sound integrity, and as honourable feelings as any of this Kingdom—by your example make it the fashion among our countrymen to treat them with courtesy and as participators in the same equal rights of society with themselves.

"They [the Hindus] are gentle, benevolent, more susceptible of gratitude for kindness shewn them than prompt to vengeance for wrongs sustained....The least therefore that can be expected of the most liberal and enlightened of all nations, that which providence has appointed the guardian of their civil rights, is to protect their persons from wrong and to leave their religious creed to the Being who has so long endured it and who will in his own time reform it." (Quoted by Woodruff, Philip, *The Men Who Ruled India*, vol. 1, London: Jonathan Cope, 1963, p. 124-25.

<sup>12</sup> Hastings' illegal arrest and deposition of Chait Singh, the Raja of Benares, for the latter's alleged failure to pay tribute demanded by the Company, was one of the most serious charges brought against him at his impeachment. Dodwell, *op. cit.* (ref. 5), pp. 295-306.

neglect. That is, they sought to extend the scope of the Company's activities in India and to protect the rights of the population who lived in territory under its jurisdiction. But they recoiled from the notion that local institutions should be tampered with unduly, or that the Company should introduce European culture or institutions to the population of the subcontinent. For example, in 1813, well after his retirement and exoneration by Parliament, Hastings urged a select committee of the House of Lords not to relax the stringent restrictions on Christian missionaries in British India, on the grounds that these missionaries could do nothing but harm to the Company by upsetting the Hindus and Muslims.<sup>13</sup> He used similar arguments in opposition to a proposal by the eminent Sanskrit scholar Charles Wilkins, who had suggested the incorporation of the scattered seats of traditional learning in Benaras as a University. Wilkins felt that by this act the Company could gain considerable credit among the influential Hindus, and at the same time create an institution through which Western learning could be introduced to them. Hastings argued that the Pandits at Benaras had no need for such official patronage was instrumental in laying Wilkin's scheme to rest.<sup>14</sup>

Upon its inauguration in Calcutta on January 15, 1784, the Asiatick Society having "resolved to follow as nearly as possible, the plan of the Royal Society at London, of which the King is Patron" requested "the Governor General [Hastings] and Council, as Executive Power in the Companies' territories" to become patrons, and Hastings himself to assume the presidency.<sup>15</sup> The Governor General and Council accepted patronage, but Hastings declined the presidency, yielding to Sir William Jones, "...the Gentleman whose genius planned the institution, and is most capable of conducting it to the attainment of the great and splendid purposes of its formation."<sup>16</sup>

Sir William Jones had arrived in Calcutta in 1783 to assume his post as a Justice of the Supreme Court in Bengal, and was to remain in India until his death from cancer in 1794 at the age of 47. By 1783 he was already a renowned Orientalist whom Samuel Johnson had called "...the most enlightened of the sons of man," a Fellow of the Royal Society, and a member of the Whig circle which openly opposed Lord North's policy during the American Revolution.<sup>17</sup> He numbered Benjamin Franklin among his correspondents, visited him in Paris on three occasions during the American Revolution, and at one time addressed to him a Latin allegory which was a thinly disguised proposal for ending the

<sup>13</sup> British Museum Additional Manuscript 29, 202, folios 344-53. Despite Hastings' plea the India Act passed by Parliament in that year permitted Christian missionaries to proselytize in British India for the first time.

<sup>14</sup> British Museum Additional Manuscript 29, 234; folios 204-216.

<sup>15</sup> *Asiatick Researches*, vol. 1, Calcutta, 1788, p. 4.

<sup>16</sup> *Asiatick Researches*, *op. cit.* (ref. 15), pp. vii-viii.

<sup>17</sup> Unless otherwise noted, biographical notes on Jones are taken from Cannon, Garland, *Oriental Jones*, London: Asia Publishing House, 1964.

Revolution on terms he hoped the American colonies might find acceptable.<sup>18</sup> Despairing of the abuses he perceived in North's ministry and frustrated by a seven-year delay in his appointment to the bench at Calcutta, he had seriously considered emigrating to Philadelphia or Virginia.<sup>19</sup> As Justice at Calcutta he sought to apply the best standards of English justice to the Hindu and Muslim plaintiffs, while doing so in terms consistent with their own traditions.<sup>20</sup> To this end he undertook the study of Sanskrit so that he would have direct access to the traditional laws, and ultimately translated into English the voluminous Ordinances of Menu, then believed to be the most venerable Sanskrit digest of the law, for use as a standard by English judges in India.<sup>21</sup>

Jones' political views can be gleaned from his voluminous correspondence. His wide-ranging interests, his determination to bring justice to India, as well as his ideas on Asia, Asians, and the proper role of the British in India are also evident from these letters as well as from his Presidential addresses to the Asiatick Society.<sup>22</sup> He is outspokenly in favor of individual liberty and justice for all peoples,<sup>23</sup> but certainly believes in European superiority<sup>24</sup> and the manifest destiny

<sup>18</sup> Cannon, Garland (ed), *The Letters of Sir William Jones*, Oxford: Clarendon Press, 1970, pp. 290-7; 443; 492; 517; 562; 593; 607; and 611.

<sup>19</sup> Cannon, *Letters, op. cit.* (ref. 18), pp. 563-64.

<sup>20</sup> In a letter to John Shore dated 7 February 1788, Jones wrote: "...a British tribunal, for punishment of religious offenses by Hindus or Mussulmans, would not only be an inquisition of the most extraordinary kind, but would, I am persuaded, be offensive in the beginning, and oppressive in the end, to the natives of both religions." Cannon, *Letters, op. cit.* (ref. 18), p. 787.

<sup>21</sup> "But my great object, at which I have long been labouring, is to give our country a complete digest of Hindu and Mussulman law. I have enabled myself by excessive care to read the oldest Sanscrit law books with the help of a loose Persian paraphrase; and I have begun a translation of Menu into English; the best Arabian law tract, I translated last year." (Letter from Sir William Jones to Sir John Macpherson, dated 6 May 1786; Cannon, *Letters, op. cit.* (ref. 18), p. 699.) Jones' later, more detailed proposal for his law digest is given in a letter to the First Marquis of Cornwallis dated 19 March 1788. (Cannon, *Letters, op. cit.*, pp. 794-800.)

<sup>22</sup> Jones' eleven annual Presidential Discourses were published in the first four volumes of *Asiatick Researches* as follows:

- i. (1784): "Discourse on the Institution of the Society," vol. I, pp. ix-xvi.
- ii. (1785): "Second Anniversary Discourse," vol. I, pp. 405-14.
- iii. (1786): "On the Hindus," vol. I, pp. 415-31.
- iv. (1787): "On the Arabs," vol. II, pp. 1-17.
- v. (1788): "On the Tartars," vol. II, pp. 19-41.
- vi. (1789): "On the Persians," vol. II, pp. 43-66.
- vii. (1790): "On the Chinese," vol. II, pp. 365-381.
- viii. (1791): "On the Borderers, Mountaineers, and Islanders of Asia," vol. III, pp. 1-16.
- ix. (1792): "On the Origin and Families of Nations," vol. III, pp. 479-92.
- x. (1793): "On Asiatic History, Civil and Natural," vol. IV, pp. i-xxxv.
- xi. (1794): "On the Philosophy of the Asiatics," vol. IV, pp. 157-173.

<sup>23</sup> "Nothing indeed could be more obviously just, than to determine private contests according to those laws, which the parties themselves had ever considered as the rules of their conduct and engagements in civil life; nor could any thing be wiser than, by a legislative act, to assure

of England's commercial enterprise.<sup>25</sup> As an Orientalist proficient in Arabic and Persian and ultimately in Sanskrit, he believes Europe can benefit from a study of Asiatic antiquity.<sup>26</sup> He ultimately professes his belief that Sanskrit is a finer language than either Greek or Latin.<sup>27</sup> Yet he views the 18th century Hindu as

the Hindu and Muselman subjects of Great Britain, that the private laws, which they severally hold sacred, and a violation of which they would have thought the most grievous oppression, should not be superseded by a new system, of which they could have no knowledge, and which they must have considered as imposed on them by a spirit of rigour and intolerance." (Letter to the first Marquis of Cornwallis, dated 19 March 1788; Cannon, *Letters, op. cit.*, ref. 18, p. 794.)

"I rejoice that the king is well; but take no interest in the contests of your aristocratical factions. My party is that of the whole people; and my principles, which the law taught me, are only to be changed by a change of existence." (Letter to John Eardley-Wilmot dated 20 September 1789; Cannon, *Letters, op. cit.*, p. 848.)

"As to the house of commons, as it is now managed, I know of no motive on earth, that could induce me to sit in it (even if all the counties of England were to vie with each other in pressing me to accept a seat) except some rational hope of doing solid good in a time (which Heaven avert!) of great public danger, when it would behove every man in the ship to work at the pump; but such a time is, I anxiously hope, very distant. At present the total subversion of our legal and recorded constitution, without a hope of its being restored, leaves every lover of it at perfect liberty to seek his own tranquillity in his Sabine farm." (Letter to the second Earl of Spencer dated 19 October 1791; Cannon, *Letters, op. cit.*, ref. 22, p. 897.)

<sup>24</sup> "Whoever travels in Asia, especially if he be conversant with the literature of the countries through which he passes, must naturally remark the superiority of European talents. The observation, indeed, is as old as Alexander."

"...We may decide, on the whole, that reason and taste are the grand prerogatives of European minds, while the Asiaticks have soared to loftier heights in the sphere of the imagination." ("Second Anniversary Discourse," *Asiatick Researches*, v. I, Calcutta, 1788, pp. 406-07.)

<sup>25</sup> "May your commercial blossom arrive at maturity, with all the vigor of Indian vegetation!"

"My soul expands, like your blossom, at the idea of improved commerce; no subject is to me more animating." (Letter to Sir John Macpherson, dated 6 May 1786; Cannon, *Letters, op. cit.*, ref. 18, p. 699).

"We have a still nearer interest in knowing all former modes of ruling these inestimable provinces, on the prosperity of which so much of our national welfare and individual benefit seems to depend." ("Second Anniversary Discourse," *op. cit.*, ref. 24, p. 407.)

<sup>26</sup> "I am now collating a very ancient Sanskrit book on Musick in beautiful verse; but very concise; and, therefore, very obscure. These inquiries go beyond the mere gratification of curiosity: they may suggest improvements in our own musical system." (Letter to the second Earl Spencer, dated 28 August 1787; Cannon, *Letters, op. cit.*, ref. 18, p. 759-60.)

"So highly has medical skill been prized by the ancient Indians, that among the fourteen Retna's, or precious things, ... was a learned physician." ("Second Anniversary Discourse," *op. cit.*, p. 408.)

"Could the works of Archimedes, the Newton of Sicily, be restored to their genuine purity by the help of Arabick versions, we might then have reason to triumph on the success of our scientific inquiries; or could the successive improvements and various rules of algebra be traced through Arabian channels, ... the modern history of Mathematicks would receive considerable illustration." ("Second Anniversary Discourse," *op. cit.*, p. 412.)

<sup>27</sup> "The Sanscrit language, whatever be its antiquity, is of a wonderful structure; more perfect than Greek, more copious than Latin, and more exquisitely refined than either; yet

a child who must be protected by an enlightened British policy.<sup>28</sup> The Pandits with whom he delights to converse in Sanskrit have inherited an ancient wisdom, but it is a dead, static wisdom—in a word, Asian rather than European.<sup>29</sup>

Jones' Presidential Addresses as well as his correspondence suggest that he was consciously trying to mold the Asiatick Society into a colonial version of the Royal Society "which, at first, was only a meeting of a few literary friends at Oxford, [but] rose gradually to that splendid zenith, at which a Halley was their secretary, and a Newton their president."<sup>30</sup> It was to be "a Society for inquiring into the History and Antiquities, the Natural Productions, Arts, Sciences, and Literature of Asia."<sup>31</sup> Jones frequently confessed that he had accepted his official appointment in order to satisfy his desire to further his Oriental studies, once writing that "it is my ambition to know India better than any other European ever knew it."<sup>32</sup> But "when I considered, with pain, that, in this fluctuating, imperfect and limited condition of life, such inquiries could only be made by the united efforts of many, . . . I consoled myself with a hope . . . that, if in any country such an union could be effected, it was among my countrymen in Bengal."<sup>33</sup>

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bearing to both of them a stronger affinity, high in the roots of verbs, and in the forms of grammar, than could possibly have been produced by accident." ("Third Anniversary Discourse—On the Hindus," *op. cit.*, ref. 22, pp. 422–23.)

<sup>28</sup> "Our nation, in the name of the king, has twenty three millions of black subjects in these two provinces [Bengal and Bihar]; but nine tenths of their property are taken from them, and it has even been publicly insisted, that they should have no landed property at all: if my Digest of Indian Law should give stability to their property, real and personal, and security to their persons, it will be the greatest benefit they ever received from us." Letter to Lady Spencer, dated 24 October 1791; Cannon, *Letters*, *op. cit.*, ref. 18, p. 902–03.)

<sup>29</sup> "Bernier, who was himself of the faculty, mentions approved medical books in Sanscrit, . . . but we can expect nothing so important from the works of Hindu or Muselman physicians, as the knowledge which experience must have given them, of simple medicines." ("Second Anniversary Discourse," *op. cit.*, ref. 22, p. 408.)

" . . . nor can we reasonably doubt, how degenerate and abased so ever the Hindus may now appear, that in some early age they were splendid in arts and arms, happy in government, wise in legislation, and eminent in various knowledge." ("Third Anniversary Discourse—On the Hindus," *op. cit.*, ref. 22, p. 421.)

" . . . though I offered ample stipends to any Hindu astronomer who could name, in Sanscrit, all the constellations I should point out; and to any Hindu physician who could bring me all the plants named in Sanscrit books, I was assured by the Brahmen whom I had commissioned to search for such instructors, that no Pandit in Bengal even pretended to possess the knowledge which I required." ("Remark by the President" on a letter dated 10 October 1792 from John Playfair, Professor of Mathematics at Edinburgh; *Asiatick Researches*, v. IV, Calcutta: 1794, p. 155.)

<sup>30</sup> Jones, "Discourse on the Institution of the Society," *op. cit.*, (ref. 22), pp. x–xi.

<sup>31</sup> Jones, "Discourse on the Institution of the Society," *op. cit.*, (ref. 22), p. x.

<sup>32</sup> Jones, Letter to the second Earl Spencer dated 17 August 1787; Cannon, *Letters*, *op. cit.*, (ref. 18), p. 751.

<sup>33</sup> Jones, "Discourse on the Institution of the Society," *op. cit.*, (ref. 22), p. x.



A century earlier Sprat wrote of the Royal Society Fellows: "Their purpose is, in short, to make faithful Records of all the Works of Nature, or Art, which can come within their reach,"<sup>34</sup> and, "These two Subjects, God and the Soul, being onely forborn: In all the rest, they wander, at their pleasure."<sup>35</sup> In 1784 Jones could state "If it now be asked, what are the intended objects of our inquiries within these spacious limits [Asia], we answer, MAN and NATURE; whatever is performed by the one, or produced by the other."<sup>36</sup>

Sprat had noted with approval that among the members of the Royal Society "the farr greater Number are Gentlemen, free and unconfin'd. By the help of this, there was hopefull Provision made against two corruptions of Learning, which have long been complain'd of, but never remov'd: The one, that Knowledge still degenerates to consult present profit too soon; the other, that Philosophers have bin always Masters and Scholars; some imposing, and all the other, submitting."<sup>37</sup> Jones regretted that Sprat's criterion could not be satisfied in India, for "A mere man of letters, retired from the world, and allotting his whole time to philosophical or literary pursuits, is a character unkown among Europeans resident in India, where every individual is a man of business in the civil or military state, and constantly occupied either in the affairs of government, in the administration of justice, in some department of revenue or commerce, or in one of the liberal professions."<sup>38</sup> Yet "there is an active spirit in European minds... which seems to consider nothing done or learned, while any thing remains unperformed or unlearned."<sup>39</sup>

Although Jones acknowledges his debt to the Royal Society and seeks to model the Asiatick Society upon it, one also senses the delight he feels at the conviction that he and his colleagues in the Society are breaking new ground. Sprat had written: "Into the East, the first Inquisitive Men amongst the Grecians traveled: By what they observed there, they ripened their own imperfect Conceptions, and so return'd to teach them at home."<sup>40</sup> To Jones, the Asiatick Society could be the instrument whereby the inquisitive men among the British could gain knowledge from the East for their own benefit. Writing to the second Earl Spencer about his progress in learning Sanskrit, Jones noted "Need I say what exquisite pleasure I receive from conversing easily with that class of men [the Pandits] who conversed with Pythagoras, Thales, and Solon, but with this

<sup>34</sup> Sprat, Thomas. *History of the Royal Society*. (London, 1667); edited and with critical apparatus by Jackson I. Cope and Harold Whitmore Jones. London: Routledge and Kegan Paul, Ltd., p. 61.

<sup>35</sup> Sprat, *op. cit.*, (ref. 34), p. 83.

<sup>36</sup> Jones, "Discourse on the Institution of the Society," *op. cit.*, (ref. 22), p. xii-xiii.

<sup>37</sup> Sprat, *op. cit.*, (ref. 34), p. 67.

<sup>38</sup> Jones, "Introduction" to *Asiatick Researches*, v. I, *op. cit.*, (ref. 15), p. iii.

<sup>39</sup> Jones, "Introduction," *op. cit.*, (ref. 38), p. iii.

<sup>40</sup> Sprat, *op. cit.*, (ref. 34), p. 6.

advantage over the Grecian travellers, that I have no need of an interpreter."<sup>41</sup>

### III. Scientific Contributions of Society Members

Until the founding of the Calcutta Agricultural Society in 1820 and the Calcutta Medical and Physical Society in 1823, the Asiatick Society was the sole organized, autonomous European group in India which dealt with scientific matters, while its journal, *Asiatick Researches* (the first four volumes of which were edited by Jones), served as the sole English medium of learned communication in India prior to the 1820's.<sup>42</sup>

For convenience, the formative years of the Asiatick Society can be taken as extending up to 1839, the year which marked the publication of the 20th and final volume of *Asiatick Researches*. This journal was superseded thereafter with the more professionalized *Journal of the Asiatic Society of Bengal*. The scientific work reported in the *Asiatick Researches* was predominantly amateur in nature. Its first eighteen volumes are filled with astronomical, geographical, meteorological, geological, botanical, zoological, and ethnographical data submitted by or through members in all parts of India. However, as already noted, some communications of a semi-official character also appear. In fact, the proportion of the latter increase with time. Thus volumes VI, VII, X and XII contain notes on the progress of the Survey of South India by Colonel William Lambton;<sup>43</sup> Vol. XII has a paper by Captain John Warren, Acting Astronomer of the Company's observatory at Madras;<sup>44</sup> Dr. William Roxburgh, Superintendent of the Company's Botanical Gardens in Calcutta, was a frequent contributor.<sup>45</sup> Volume

<sup>41</sup> Jones, Letter to the second Earl Spencer dated 23 August 1787. Cannon, *Letters, op. cit.*, (ref. 18), p. 756.

<sup>42</sup> Volume 1 of the *Transactions of Agricultural Society of India* (Calcutta) was published in 1823, three years after the founding of the Society, and became the first professional scientific journal in English on the subcontinent. Volume 1 of the *Transactions of the Medical and Physical Society, Calcutta* was published in 1825. In 1837 it was superseded by the *Quarterly Journal of the Medical and Physical Society, Calcutta*.

<sup>43</sup> Lambton, William, "An Account of a Method for extending a Geographical Survey across the Peninsula of India," *Asiatick Researches*, v. VIII, pp. 312-35; "An Account of the Trigonometrical Operations in Crossing the Peninsula of India, and Connecting Fort St. George with Mangalore," *ibid.*, v. X, pp. 290-384; "Measurement of an Arc on the Meridian Extending from Latitude 10°59'49" to 15°6'0"65" North," *ibid.*, v. XII, pp. 1-101; "Measurement of an Arc on the Meridian Extending from Latitude 15°6'2" to Latitude 18°3'45", being a further continuation of the former Arc, commencing Latitude 8°9'38"," *ibid.*, v. XIII, pp. 1-127.

<sup>44</sup> Warren, John, "Experiments Made in Mysore Country, in the year 1804, to Investigate the Effects of Terrestrial Refraction," *Asiatick Researches*, vol. IX, pp. 1-23; "Observations Taken at the Observatory near Fort St. George, in the East Indies, for Determining the Obliquity of the Ecliptic; in the Months of December, 1809, June and December, 1810," *ibid.*, vol. XII, pp. 192-210.

<sup>45</sup> Roxburgh, William, "Essay on the Lac Insect," *Asiatick Researches*, vol. II, p. 361; "On the Butea Plant," *ibid.*, vol. III, p. 469; "On the Prosopis Aculeata of Koenig," *ibid.*, vol. IV, p. 405; "On the Spikenard of Ancients," *ibid.*, vol. IV, p. 435; "A Description of the Jonesia," *ibid.*, vol. IV, p. 353; "Botanical Description of Caout-Chouc of Penang," *ibid.*, vol. V, p. 167; "On a New Species of Delphinus," *ibid.*, vol. VII, p. 170; "On the Monandrous Plants of India," *ibid.*, vol. XI, p. 318.

XVIII contains two papers relating to the new Geographical Survey of India by George Everest, the Surveyor General.<sup>46</sup> Volume XVIII itself is divided into two parts. Part I, published in 1829, deals in its entirety with geological investigations undertaken by members of the society.<sup>47</sup>

However, the founders of the Asiatic Society certainly did not regard it primarily as a scientific society, nor did scientific studies ever become the dominant concern of its membership. Perhaps significantly, among the twelve people who contributed three or more papers to the first 18 volumes of *Asiatick Researches*, all but three contributed papers on literary, linguistic or historical topics as well, and/or contributed to these fields outside the pages of *Asiatick Researches*.<sup>48</sup> Among these early pillars of the Society, the names of William Jones, Reuben Burrow, William Hunter, Samuel Davis, John Warren, William Roxburgh, Henry Colebrook and James Prinsep are prominent.

As already suggested, Jones was, by training and temperament, more an antiquarian than a scientist. In his inaugural discourse he gave his conception of the types of investigation he hoped the Society would undertake:

"The three main branches of learning are history, science, and art. The first comprehends either an account of natural productions, or the genuine records of empires and states; the second embraces the whole circle of pure and mixed mathematics, together with ethicks and law, as far as they depend on the reasoning faculty; and the third includes all the beauties of imagery, and the charms of invention, displayed in modulated language, or repre-

<sup>46</sup> Everest, George, "On Formulae for Calculating Azimuths," *Asiatic Researches*, vol. XVIII, Part 2, p. 93; "On the Compensation Bars of the Trigonometrical Survey," *ibid.*, p. 189.

<sup>47</sup> Volume, XVIII, Part I of *Asiatic Researches* was issued by the Physical Class of the Society, formed in January, 1828. The Introduction to the Volume recounts the conditions under which the Physical Class was formed, noting that:

"Towards the close of 1827, several members of the Asiatic Society, who felt an interest in scientific enquiries, and who conceived that the ordinary Meetings of the Society were held at intervals too remote, and for purposes of too miscellaneous a nature to be calculated to promote scientific investigation, were induced to consider the most effective means to be pursued for the special furtherance of that object...."

"The subjects to which the attention of the Physical Class of the Asiatic Society is primarily directed, are the Zoology, Meteorology, Mineralogy, and Geology of Hindustan."

However, the Introduction to the Volume also took pains to reassure Society members that amateurs could still contribute significantly, stating:

"In order to assist persons unpracticed in Geology, the Physical Class are about to republish Dr. Fitton's instructions for collecting Geological specimens with additional directions, which they are anxious to distribute as extensively as possible to all who have an opportunity of collecting specimens and forwarding them to the Society."

It is worth noting that for the first time in this issue of its journal the Society is called the Asiatic Society of Bengal, rather than the Asiatick Society, the Royal Asiatic Society of Great Britain and Ireland having been founded in 1826.

<sup>48</sup> Prinsep, James. *Index to the First Eighteen Volumes of Asiatick Researches*. Calcutta: Asiatick Society, 1837.

sented by color, figure, or sound."<sup>49</sup>

Jones earnestly hoped that from a study of Persian and Sanskrit texts on mathematics, astronomy, botany, and medicine "many valuable hints may be derived for our own improvement and advantage."<sup>50</sup> His Second Anniversary Discourse catalogues the sorts of investigations into Indian chemistry and botany which he thinks are likely to be of benefit to Europe,<sup>51</sup> but suggests that he is beginning to doubt that Indian mathematics and astronomy have much to offer—even though their study has its own intrinsic merit.<sup>52</sup>

As editor of the first four volumes of *Asiatick Researches*, Jones was instrumental in setting its tone and determining its style. Among his contributions to these volumes on scientific subjects one finds a paper entitled "On the Chronology of the Hindus,"<sup>53</sup> which was an attempt to unravel the confused, semi-mythological Hindu dating system through astronomical methods in the manner Newton had introduced in his *Chronology of Ancient Kingdoms*.<sup>54</sup> (Indeed, one can argue that Jones felt he was writing an appendix to Newton's work by incorporating data on an Ancient Kingdom to which Newton had no access.) His other antiquarian papers on Indian astronomy in *Asiatick Researches* were "On the Antiquity of the Indian Zodiac" and "The Lunar Year of the Hindus."<sup>55</sup>

Jones' more strictly scientific papers in *Asiatick Researches* were confined largely to botanical topics, though his correspondence with Samuel Davis indicates a growing interest in astronomy during the last years of his life.<sup>56</sup> His botanical investigations included "The Design of a Treatise on the Plants of India," "On the Spikenard of the Antients," "A Catalogue of Indian Plants Comprehending their Sanscrit, and as Many of their Linnaean Generic Names as Could with Any Degree of Precision be Ascertained," and "Botanical Observations on Select Indian Plants."<sup>57</sup> (Following Jones' death William Roxburgh

<sup>49</sup> Jones, "Discourse on the Institution of the Society," *op. cit.*, (ref. 22), p. xiii.

<sup>50</sup> Jones, "Second Anniversary Discourse," *op. cit.*, (ref. 22), p. 407.

<sup>51</sup> Jones, "Second Anniversary Discourse," *op. cit.*, (ref. 22), pp. 408-09.

<sup>52</sup> "I have seen a mathematical book in Sanscrit of the highest antiquity; but soon perceived, from the diagrams, that it contained only simple elements. There may, indeed, have been in the favorable atmosphere of Asia, some diligent observers of celestial bodies; and such observations as are recorded should indisputably be made public; but let us not expect any new methods, or the analysis of new curves, from the geometricians of Iran, Turkistan, or India." Jones, "Second Anniversary Discourse," *op. cit.*, (ref. 22), p. 412.

<sup>53</sup> Jones, William, "On the Chronology of the Hindus," *Asiatick Researches*, vol. II, Calcutta, 1790, pp. 111-46; "A Supplement to the Essay on Indian Chronology," *ibid.*, pp. 390-403.

<sup>54</sup> Newton, Issac, *The Chronology of Ancient Kingdoms, Amended*, Dublin, 1728.

<sup>55</sup> *Asiatick Researches*, vol. II, Calcutta, 1790, pp. 289-306; vol. III, Calcutta, 1792, pp. 257-93.

<sup>56</sup> Cannon, *Letters*, *op. cit.*, (ref. 18), pages 671, 695, 704, 923-4, 829-33, 836-7, 852, 856-62, 876, 878-9, 880, 887-8, 905, 907-10, 912, 916, 917, 919, 925-6, 930-2.

<sup>57</sup> *Asiatick Researches*, vol. II, Calcutta, 1790, pp. 343-52; *ibid.*, pp. 405-17; *ibid.*, vol. IV, Calcutta, 1794, pp. 225-29; *ibid.*, pp. 231-303. See also Jones, William, "Note Added to a Paper on the Dhanesa, or Indian Buceros" by Charles White, *Asiatick Researches*, v. IV, pp. 127-31; and "Additional Remarks on the Spikenard of the Antients," *ibid.*, pp. 97-107.

proposed to recognize his botanical contributions by officially designating a species of Ashoka tree the *Jonesia Ashoka*.<sup>58</sup>) Jones also contributed one zoological article entitled "On the Loris, or Slow-Paced Lemur" to the *Asiatick Researches*.<sup>59</sup>

During his years in India, Jones remained in correspondence with Sir Joseph Banks, President of the Royal Society, and frequently submitted botanical specimens to the Society through him.<sup>60</sup> His eleven Anniversary Discourses contain numerous passages on Hindu philosophy, astronomy, mathematics, and medicine.<sup>62</sup> It was conjectured by Sir John Shore that Jones planned to expand these remarks into several long articles, for among the papers found at his death, one listed twenty three "Desiderata," or topics for such papers. Among these, four dealt with scientific topics: "A Botanical Description of Indian Plants," "On Medicinal Substances of India, and the India Art of Medicine," "On Indian Geometry, Astronomy, and Medicine," and "On the Indian Constellations, with their Mythology, from the Puranas."<sup>61</sup>

As President of the Asiatick Society and editor of its journal, Jones also encouraged and/or edited the contributions of other members, such as Samuel Davis and Reuben Burrow.

Samuel Davis a civil servant in Benares and an amateur astronomer and Sanskrit scholar, remained in intimate correspondence with Jones until a month before the latter's death.<sup>62</sup> (Jones' last extant letter is written to Davis and deals with botanical and astronomical topics.)<sup>63</sup> His lengthy "On the Astronomical Computations of the Hindus" appeared in Vol. II of *Asiatick Researches*, and includes long passages which he himself translated from the venerable *Surya Siddhanta* (Textbook of the Sun).<sup>63</sup> In this paper Davis proceeded to carry out solar eclipse calculations using the methods of the *Surya Siddhanta*, and to evaluate them by comparing their predictions with those based on contemporary methods. Jones saw the importance of Davis' work primarily as an initial attempt to evaluate Hindu astronomy in terms of its primary sources, and urged him to translate the complete text. He was seconded in his plea by John Playfair,

<sup>58</sup> Roxburgh, William, "A Description of the Jonesia," *Asiatick Researches*, vol. IV, pp. 353-55.

<sup>59</sup> *Asiatick Researches*, vol. IV, pp. 127-31.

<sup>60</sup> Cannon, *Letters*, *op. cit.*, (ref. 18), pages 786, 790, 814, 842, 854, 891, 903, 906.

<sup>61</sup> Shore, John, *Asiatick Researches*, vol. IV, p. 181.

<sup>62</sup> "As a week only of March remains, I am not without hope, that you will pass next Sunday with me at my farm; and we will then talk of Jayasenh [Raja Sawai Jai Singh II of Amber and Jaipur] and his achievements. . . . I have given you a great deal of trouble about the Tamāla; but the leaves, flowers, and fruit, which you so obligingly sent, are those of the Dēp'hal, a very different plant, resembling the Tamāla only in the form and the colour of the leaves: I am equally thankful for the specimen, as it is a new species of *Hypericum*."

Letter to Samuel Davis, dated 24 March 1794; Cannon, *Letters*, *op. cit.*, (ref. 18), p. 932.

<sup>63</sup> Davis, Samuel, "On the Astronomical Computations of the Hindus," *Asiatick Researches*, v. II, pp. 225-87.

Professor of Mathematics at Edinburgh.<sup>64</sup> Further long excerpts from it appear in Davis' "On the Indian Cycle of Sixty Years" in Volume III of *Asiatick Researches*;<sup>65</sup> however, he seems never to have completed a full translation.

Davis' published contributions were more historical than strictly scientific, and thus well suited to Jones' taste. In contrast, Reuben Burrow, a founding member of the Society, sprinkled the first four volumes of *Asiatick Researches* with brief notes such as "Hints on Friction in Mechanics," "A Method for Improving the Use of Artificial Horizons," "A Method of Calculating the Moon's Parallax in Latitude and Longitude," "A Proof that the Hindoos had the Binomial Theorem," as well as numerous original latitude and longitude reports.<sup>66</sup> He was enthralled with the antiquity of Hindu astronomy, and in one paper suggested that the builders of Stonehenge had been Hindus.<sup>67</sup> Jones tried in vain to convince him to weave all his small notes into a long dissertation.<sup>68</sup> But that seems not to have been Burrow's style.<sup>69</sup> From 1775-78 he had edited a London almanac entitled *Ladies and Gentleman's Diary* (which contained queries and problems of considerable complexity). For a time he was assistant to Nevil Maskelyne, the Astronomer Royal, but resigned when he felt the latter had taken too much credit for joint work carried out at Shehallion, in Scotland.<sup>70</sup> He then

<sup>64</sup> Playfair, John, "Questions and Remarks on the Astronomy of the Hindus," *Asiatick Researches*, v. IV, pp. 151-54; Jones, William, "Remarks on Professor Playfair's Letter," *ibid.*, p. 155.

<sup>65</sup> Davis, Samuel, "On the Indian Cycle of Sixty Years," *Asiatick Researches*, v. III, pp. 209-27.

<sup>66</sup> Burrows' scientific contributions to *Asiatick Researches* included "Hints Relative to Friction in Mechanics," vol. I, pp. 171-95; "A Method of Calculating the Moon's Parallax in Latitude and Longitude," vol. I, pp. 320-26; "Remarks on Artificial Horizons," vol. I, pp. 327-29; "Demonstration of a Theorem Concerning the Intersection of Curves," vol. I, pp. 330-31; "Corrections of the Lunar Method of Finding the Longitude," vol. I, pp. 432-34; "A Proof that the Hindoos Had the Binomial Theorem," vol. II; "A Specimen of a Method of Reducing Practical Tables and Calculations into More General and Compendious Forms," vol. III, pp. 141-47; "A Note on the Astronomical Observations Reported by R. H. Colebrook," vol. IV, p. 327.

<sup>67</sup> Burrow, Reuben, "Memorandums Concerning an Old Building in the Hadjipure District," *Asiatick Researches*, vol. II, pp. 477-81.

<sup>68</sup> "I have attentively perused the papers, which you were so kind as to send, and heartily wish, that we could persuade the ingenious author [Burrow] to arrange them together in the form of a 'Dissertation on the Astronomy of the Hindus.' In their present state they are but rough sketches, and I doubt whether he would consent to their publication." Jones, letter to Thomas D. Pearse dated 17 June 1787; Cannon, *Letters, op. cit.*, (ref. 18), pp. 737-38.

<sup>69</sup> Unless otherwise noted biographical notes on Reuben Burrow were obtained from *Dictionary of National Biography*, vol. III, Oxford University Press, 1917, pp. 448-49.

<sup>70</sup> In an unpublished letter to the President and Council of the Royal Society dated 26 January 1775 Burrow wrote:

"I had fixed the observatory, and set up and adjusted the sector, and prepared everything for beginning the Observations before that Gentleman [Mr. Maskelyne] arrived... and should have had a great part of the business done before he came had the weather not been so uncommonly bad." (Royal Society Library, London.)

became instructor in mathematics to the Army Engineers at the Tower. His private diaries alternate between demonstrations of abstruse geometric theorems and scurrilous, often witty comments on his contemporaries.<sup>71</sup>

Shortly after arriving in India in 1783, Burrow addressed a long memo to Warren Hastings proposing to undertake the first systematic survey of Bengal and Bihar, and coincidentally to study ancient Hindu astronomy.<sup>72</sup> Ultimately he received the desired commission, spent three seasons surveying in the Ganges basin, and died in 1792 of a tropical disease contracted during the course of his work. A contemporary geographer has credited Burrow with having made the first astronomically controlled survey measurements in North India.<sup>73</sup>

William Hunter was the amateur scientist and self-made man *par excellence*. After receiving his MA from Marischal College, Aberdeen, in 1777 he was apprenticed to a surgeon for four years.<sup>74</sup> During that time he published a note on the improvement of the screw in the *Philosophical Transactions of the Royal Society*.<sup>75</sup> In 1781 he served as doctor on an East Indiaman bound for Calcutta; in 1783 he became an assistant surgeon to the East India Company, a year later Surgeon to the Company in Bengal, and in 1790 Surgeon to the British Resident in Agra. In the latter capacity he became a member of a British expedition which traveled to Ujjain and back between 23 February 1792 and 21 April 1793, presumably for the purpose of showing the flag in these non-British territories. Volume IV of *Asiatick Researches* contains a lengthy compilation of latitude and longitude measurements made by Hunter during this expedition.<sup>76</sup> On his travels he also studied carefully the observatories of Jai Singh at Benares, Delhi and Ujjain, and found a manuscript copy of the latter's *Zij Muhammad Shahi* at Ujjain. Volume V of *Asiatick Researches* contains his description of the observatories, his translation of the Preface to the manuscript and an outline of its contents—together with the curious assertion that Jai Singh was to be credited with recognizing the superiority of European astronomy!<sup>77</sup> His "Essay on the Diseases Incident to Indian Seamen, or Lascars, on Long Voyages" was published in Calcutta by

<sup>71</sup> Burrow's private journals in three volumes were presented to the Royal Astronomical Society, London, by J. J. Wilkinson in 1853.

<sup>72</sup> Unpublished letter to Hastings, British Museum Additional Manuscript 29, 233, folios 263–76.

<sup>73</sup> Phillimore, Reginald H., *Historical Records, Survey of India*, vol. I, Dehra Dun, 1946, pp. 155–67.

<sup>74</sup> Unless otherwise noted biographical notes on William Hunter were obtained from *Dictionary of National Biography*, v. X, Oxford University Press, 1917, p. 305.

<sup>75</sup> Hunter, William, "A New Method of Applying the Screw," *Phil. Trans.*, v. LXXI, 1781, p. 58–66.

<sup>76</sup> Hunter, William, "Astronomical Observations Made in the Upper Part of Hindustan, and on a Journey Thence to Oujein," *Asiatick Researches*, v. IV, p. 133–49.

<sup>77</sup> Hunter, William, "Some Account of the Astronomical Labours of Jayasinha, Rajah of Ambhere, or Jayanagar," *Asiatick Researches*, v. V, pp. 177–212.

the Company in 1804.<sup>78</sup>

Hunter served as Secretary of the Asiatick Society from 1798 to 1802 and again from 1804 to 1811. He became Regular Examiner in Persian and Hindustani at Lord Wellesley's short lived College of Ft. William upon its founding in 1801, and Secretary to its Council from 1805-1811. During his association with the College he supervised the preparation of both a Persian translation of the New Testament and *The Mejmu'a Shensi*, the latter a Persian treatise on the Copernican system of astronomy which was meant to serve as an introduction for educated Indians.<sup>79</sup> He also published one of the first good Hindustani-English dictionaries by revising and adding to a private vocabulary compiled by Major Joseph Taylor,<sup>80</sup> and advised Amir Muhammad of Peshwar in his attempts to compile the first Afghan-English dictionary. His private collection of Persian and Hindustani proverbs which he compiled to elucidate Oriental folkways for the newly arrived appointees in the Company's service at the College was completed and published after his death by his friend Thomas Roebuck.<sup>81</sup> Two papers in *Asiatick Researches* as well as unpublished letters of Hunter also suggest a considerable expertise in medicinal botany.<sup>82</sup>

Lieutenant (later Captain) John Warren, who had fled from revolutionary France and Anglicized his name, was for a time one of two assistants to Col. William Lambton in his survey of Mysore and the Nizam's dominions.<sup>83</sup> (The other assistant, Lt. Henry Kater, who was forced to resign his commission for reasons of health, returned to England and gained considerable fame in his efforts to improve standards of measurement.<sup>84</sup> Volume II of James Herbert's *Gleanings in Science*, published in 1830, contains Warren's moving biographical sketch of Lambton.<sup>85</sup>) Warren's contributions to the *Asiatick Researches* were submitted during his service as Acting Astronomer and Surveyor at the Company's Observatory at Fort St. George near Madras. One is a report on astronomical

<sup>78</sup> British Museum Catalogue.

<sup>79</sup> *The New Testament*, translated into the Hindoostani Language by Mirza Mohummud Fitrut. Revised by W. Hunter, 1805; *The Mejmu'a Shensi, a Summary of the Copernican System of Astronomy*. Translated into Persian under the superintendence of William Hunter. A new edition. Calcutta, 1826. (From the British Museum Catalogue.)

<sup>80</sup> Taylor, Major Joseph, *A Dictionary, Hindoostani and English*, Revised by W. Hunter, 1808.

<sup>81</sup> Roebuck, Thomas, *A Collection of Proverbs in the Persian and Hindoostani Languages*, Commenced by William Hunter, Calcutta, 1824.

<sup>82</sup> Hunter, William, "On the Plant Morinda and Its Uses," *Asiatick Researches*, vol. IV, pp. 21-30; "Remarks on the Species of Pepper, which are found on Prince of Wales Island," *ibid.*, vol. IX, pp. 383-93; Letters to General Hardwick dated 20 July, 1796, 10 October 1796, 14 August 1797, 9 April 1801, and 24 July 1802; British Museum Additional Manuscript 9869.

<sup>83</sup> Phillimore, *op. cit.*, v. II (ref. 73), pp. 449-53. (See also ref. 43.)

<sup>84</sup> Kater contributed two notes to *Asiatick Researches*, vol. IX prior to his departure from India: "Description of a Very Sensible Hygrometer," pp. 24-31, and "Description of an improved Hygrometer," pp. 393-97. (See also Phillimore, *op. cit.*, v. II (ref. 73), pp. 410-11.

<sup>85</sup> *Gleanings in Science*, vol. 2 (March 1830), pp. 73-82.



measurements made at the observatory.<sup>44</sup> During his tenure as Acting Astronomer he also carried out precise measurements of the value of  $g$  at  $10^\circ$  latitude for the purpose of deducing the figure of the earth.<sup>86</sup> John Goldingham, Warren's successor at Madras, continued these measurements with a Kater pendulum, and even convinced the Madras government to finance an expedition for the purpose of carrying them out on the equator.<sup>87</sup> Warren was also a student of South Indian astronomy and in 1825 published *A Collection of Memoirs on the Various Modes According to Which the Nations of the Southern Parts of India Divide Time*.<sup>88</sup> His official correspondence as Acting Astronomer details his official day to day work, and also suggests some of the frustration he frequently experienced in having to justify the continued existence of the observatory to a budget conscious Company.<sup>89</sup>

Dr. William Roxburgh, as already noted, was Superintendent of the Company's Botanical Gardens in Calcutta.<sup>90</sup> His contributions to *Asiatick Researches* usually involved Linnaean classifications of Indian plants and/or reports on their reputed medicinal value.<sup>45</sup> Both he and Jones believed that European medicine might profit by a study of traditional Hindu herbal techniques, and that the study of exotic plants was not only of value in itself, but could lead to knowledge on how better to cultivate those of commercial significance.<sup>91</sup>

Henry T. Colebrook, along with Charles Wilkins and William Jones, was one of the first eminent Sanskrit scholars. He is also credited with having forged the first Devinagari type.<sup>92</sup> His contributions to *Asiatick Researches*, show Jones'

<sup>86</sup> Warren, John, unpublished report among the papers of the Madras Observatory at the Royal Astronomical Society, London.

<sup>87</sup> Goldingham, John, *Madras Observatory Papers*, Madras, 1830.

<sup>88</sup> Warren, John, *Kala Sankalita, or A Collection of Memoirs On the Various Modes According to Which the Nations of the Southern Parts of India Divide Time*, Madras: College Press, 1825.

<sup>89</sup> Warren, John: Madras Observatory Correspondence; Solar Observatory Library Kodai-kanal India; and Royal Astronomical Society Library, London.

<sup>90</sup> The Company's Botanical Gardens at St. Vincent's in Calcutta were established in 1763 by Colonel Robert Kyd. Dr. Roxburgh succeeded Kyd as Superintendent upon the latter's death in 1793. (Cf. *Dictionary of National Biography*, vol. XVII, Oxford University Press, 1917, pp. 368-70.)

In a letter to Patrick Russell dated 22 September 1787 Jones wrote:

"The king has much at heart his new botanical garden at St. Vincent's; his object is two-fold, to improve the commerce of the West-India islands, and to provide the British troops on service there with medicinal plants." Cannon *Letters, op. cit.*, (ref. 18), p. 775.

<sup>91</sup> "...if you wish to transfer our Indian plants to the Western Islands, the Company must direct Kyd and Roxburgh to send them and their own Captains to receive them and attend to them. We are in sad want of a travelling Botanist with some share of my poor friend Koenig's knowledge and zeal: a stationary botanist would fix on the Indigofera as the chief object of his care." Jones, letter to Sir Joseph Banks dated 18 October 1791; Cannon, *Letters, op cit.*, (ref. 18), pp. 891-92.

<sup>92</sup> Hosten, H., "Bengal, Past and Present," *Jour. Calcutta Historical Society*, vol. IX (1914), pp. 40-63.

influence upon him, include "On the Indian and Arabick Divisions of the Zodiack," "On Olibonum or Frankincense," "On the Notions of the Hindu Astronomers, Concerning the Precession of the Equinoxes and the Motions of the Planets," and "On the Height of the Himalaya Mountains."<sup>93</sup> However, his major contribution to scientific studies was his *Sanskrit Algebra*, a translation of 8th and 12th century works of Brahmagupta and Bhascara. In a scholarly "Dissertation" Colebrook demonstrates convincingly the chronological precedence of Hindu over Arabic Algebra. Then, seemingly unable to credit the Hindus with total originality, he produces the Byzantine mathematician, Diophantus, who lived a century prior to Aryabhata (whom Bhascara identifies as his preceptor), and speculates on the possibility that Aryabhata's work was a refinement of Byzantine gropings.<sup>94</sup>

Colebrook served as President of the Asiatick Society from 1806–1815.<sup>95</sup> In 1826, following his retirement from service in India, he became a founder and first President of the Royal Asiatic Society of Great Britain and Ireland. His inaugural address pays tribute to the founding concepts of Jones, but, compared with Jones' address of 1784, also suggests how systematized Asiatic studies had become—even though they were still being carried out largely by amateur English gentlemen.<sup>96</sup>

Colebrook's tenure as President of the Asiatick Society (Calcutta) marked a decline in the number of amateur scientific contributions relative to those of a more professional character. In 1820 and 1823 the Calcutta Agricultural and the Calcutta Medical and Physical Societies were founded and commenced publishing their own journals,<sup>97</sup> while in 1828 a Medical and Physical Membership Class was established within the Asiatick Society itself.<sup>47</sup> Of equal importance, perhaps, was the establishment in 1829 of James Herbert's independent monthly called *Gleanings in Science*. It may be significant that this periodical appeared during the time the Declinists in Britain were pressing their case against the scientific establishment in general and the Royal Society in particular.<sup>97</sup> *Asiatick Researches* consisted primarily of long papers which had been read to the Society by their authors or their surrogates. It appeared irregularly whenever a sufficient number of these articles was available.<sup>47</sup> Herbert's editorials argued that *Glean-*

<sup>93</sup> *Asiatick Researches*, vol. IX, pp. 323–76; *ibid.*, pp. 377–82; *ibid.*, vol. XII, pp. 211–52; *ibid.*, pp. 253–93. Colebrook's other scientific contributions to *Asiatick Researches* were "On Indian Weights and Measures," vol. V, p. 91; and "On the Sources of the Ganges," vol. XI, p. 429.

<sup>94</sup> Colebrook, Henry T., *Algebra, with Arithmetic and Mensuration, from the Sanscrit of Brahmagupta and Bhascara*, London: John Murray, 1817.

<sup>95</sup> Prinsep, *op. cit.*, (ref. 48), pp. 227–28.

<sup>96</sup> Colebrook, Henry T., *Miscellaneous Essays*, vol. I, New Edition edited by E. B. Cowell, London: Trubner and Co., 1873, pp. 1–7.

<sup>97</sup> The most celebrated case for the Declinists was made in Babbage, Charles, *Reflections on the Decline of Science in England*. Reprinted from the 1830 edition by Augustus M. Kelley Publishers, New York, 1970.

ings would be a more congenial vehicle for serious men of science.<sup>98</sup> In Volume II he reviewed Babbage's *Reflections on the Decline of Science in England*,<sup>99</sup> and in it suggested that the Asiatick Society suffered from many of the sins which Babbage had laid at the door of the Royal Society.<sup>100</sup>

Herbert retired as editor of *Gleanings* at the end of 1831 in order to become Astronomer to the King of Oudh,<sup>101</sup> and was succeeded by James Prinsep, formerly Master of the Benares Mint and a sometimes contributor to the *Asiatick Researches*, who became Secretary of the Medical and Physical Class of the Asiatick Society in 1830 and of the Society itself in 1833.<sup>47,95</sup> In 1832 *Gleanings* became an official publication of the Society under its new name, *Journal of the Asiatic Society of Bengal*, though for the next five years most of its articles were of a non-scientific character.<sup>102</sup> However, apparently a number of the Society's members were eager for a more professional approach to various official and non-official surveys of India, for in 1837 the *Journal* began publication in two sections—one scientific, one historical and literary. During the same year an *Index to the First Eighteen Volumes of Asiatick Researches* was published under Prinsep's direction.<sup>48</sup> The last volume of the *Asiatick Researches* (Vol. XX) appeared in 1839. Thereafter, the two sections of the monthly *Journal*, and starting in 1865 the *Proceedings*, served as the periodical publications of the Society.<sup>6</sup>

#### IV. Conclusions: The Diffusion of British Science in India

William Jones' ambivalent attitude towards the contributions which Indian science could make to Europe has already been noted. On the one hand he was eager to search ancient texts for the purpose of learning what superior knowledge the Indians might have had in mathematics, astronomy and medicine; on the other, he found it difficult to admit that Asians were superior in any way to Europeans. Early contributors to the *Asiatick Researches* such as Davis, Hunter and Colebrook shared this attitude to some degree. But by the 1830's, professionalism and specialization were on the rise, both in Britain and in India. Few members of the Society pursued antiquarian investigations in science, and few British residents of Bengal speculated on whether classical Indian science could offer anything useful to Europe. The policy of the imperial government voiced

<sup>98</sup> Herbert, James, "Prefaces" to *Gleanings in Science*, Calcutta, vol. I, pp. v-ix (1829), and vol. II, pp. v-vii (1830).

<sup>99</sup> *Gleanings in Science*, *op. cit.*, vol. II, pp. 229-32 (1830).

<sup>100</sup> Babbage had argued that the amateur character of science in England had contributed to its decline vis-a-vis Continental science. He pointed out that the liberal requirements for membership in the Royal Society had led to a situation in which a majority of members were amateur gentlemen, in contrast with the French and Prussian academies where membership was a coveted distinction granted for outstanding scientific achievement.

<sup>101</sup> Prinsep, James, "Preface" to *Journal of the Asiatic Society of Bengal*, vol. I, Calcutta (1832).

<sup>102</sup> Mitra, *op. cit.*, (ref. 6), pp. 49-52; 78-80.

through its Governor General had shifted from that of a Warren Hastings who could patronize a school of traditional Islamic studies in Calcutta,<sup>103</sup> to that of a Lord William Bentinck who in 1835 could issue a Minute which concluded that: "the great object of the British Government ought to be the promotion of European literature and science among the natives of India."<sup>104</sup> Bentinck's Minute signalled the victory of the Anglicist party in their two-decade debate with the Orientalist party on the form that public education would assume in India.<sup>105</sup> Perhaps significantly, many leading members of the Asiatic Society had been in the vanguard of the defeated Orientalists.

Contemporary Indian historians have taken two different and somewhat contradictory views toward the introduction of Western scientific institutions into India. Sen focuses on the official character of science in 19th century India carried out by the various surveys, and concludes that science was no more than the handmaiden of the imperial government.<sup>106</sup> He notes that the *Centenary Review of the Asiatic Society* (Bose, ref. 6) lists only two scientific contributions from Indians, shows that in at least two instances Indians were excluded from participating in the Geographical Survey, and concludes that the British government's policy was to exclude Indians entirely from contemporary science.

In contrast, others argue that the imposition of British institutions—including Western science—terminated the organic evolution of the subcontinent's institutions. For example, in his *Discovery of India* Nehru wrote:

"...it is not inconceivable that if Britain had not undertaken this great burden in India and, as she tells us, endeavored for so long to teach us the difficult art of self-government, of which we had been so ignorant, India might not only have been freer and more prosperous but also far more advanced in science and art and all that makes life worth living."<sup>107</sup>

More specifically, Dharampal has collected a large number of detailed accounts by Europeans on the state of Indian science and technology in the 18th century; and on the basis of these concludes that:

"...it appears probable that in most respects the science and technologies of India had reached a desirable balance and equilibrium much before the eighteenth century."<sup>108</sup>

<sup>103</sup> Ashby, Eric, *Universities: British, Indian, African*, Cambridge: Harvard University Press, 1966, p. 48.

<sup>104</sup> Ashby, *op. cit.*, (ref. 103), p. 52.

<sup>105</sup> Ashby, *op. cit.*, (ref. 103), pp. 47-54.

<sup>106</sup> Sen, S. N., "The Character of the Introduction of Western Science in India During the Eighteenth and the Nineteenth Century," *Indian Journal of History of Science*, vol. I (1966), pp. 112-121.

<sup>107</sup> Nehru, Jawaharlal, *The Discovery of India*, Anchor Books, Doubleday and Company, Inc., p. 197.

<sup>108</sup> Dharampal, "Preface" to *Indian Science and Technology in the Eighteenth Century*, New Delhi: Impex India, 1971, p. 1xv.

“At the time of the European onslaught, the indigenous tendencies in India seem to have been in a state of slow resurgence. . . . With the beginning of European dominance in India, the resurgence got transformed into depression and unimaginable disorganisation. . . . The Europeans of this period belonged to a wholly alien world in relation to India. They were not only armed with the concepts and hierarchical institutions of a long feudal European past but had also been preparing for the occasion for two to three centuries. The subsequent application of their concepts and values completed the destruction of Indian science and society which had been started by the political and military defeat of India at their hands.”<sup>109</sup>

There is considerable evidence to suggest that the latter arguments are overdrawn; for, whatever the reasons, the British Government in Bengal moved slowly and reluctantly toward the introduction of Western education and science. Indeed, at times it was pushed along by Bengalis and non-official Europeans who conceived of these institutions as a means toward national resurgence.

The first educational institution patronized by the Company was the Calcutta Madrasa, established in 1781 during the tenure of Warren Hastings. Its expressed purpose was to institutionalize traditional Muslim education. A parallel institution for Hindu studies was established in Benares in 1792 as the Sanskrit College.<sup>108</sup> The first institution established for the purpose of introducing Indians to Western learning was Hindu College, founded in 1817 on the initiative of David Hare and the influential Sanskrit scholar, Raja Ram Mohan Roy.<sup>110</sup> Although Roy became famous as an interpreter of Hindu values to the West, he also strenuously opposed the extension of British patronage to traditional Sanskrit education in Bengal. In an 1823 memo to the Governor General, William Pitt, Lord Amherst, he argued:

“If it had been intended to keep the British nation in ignorance of real knowledge, the Baconian philosophy would not have been allowed to displace the system of the schoolmen which was the best calculated to perpetuate ignorance. In the same manner, the Sanskrit system of education would be the best calculated to keep this country in darkness, if such had been the policy of the British legislature. But as the improvement of the native population is the object of the Government, it will consequently promote a more liberal and enlightened system of instruction, embracing Mathematics, Natural Philosophy, Chemistry, Anatomy, with other useful sciences, which may be accomplished with the sums proposed [by Parliament] by employing a few gentlemen of talent and learning educated in Europe and providing a college furnished with necessary books, instruments and other

<sup>109</sup> Dharampal, *op. cit.*, (ref. 108), pp. lxvi-lxvii.

<sup>110</sup> Ashby, *op. cit.*, (ref. 103), p. 49.

apparatus."<sup>111</sup>

There is considerable justice in the claim that Bentinck's 1835 decision to Anglicize education completely was motivated in part by a contempt for traditional Indian thought. However, it is difficult to deny the contention that Roy's powerful advocacy of Western education strengthened the hand of the Anglicists in their running battle with the Orientalists.<sup>105</sup>

Indeed, Roy's memo can be taken as a model for discerning the profit which educated Bengalis hoped might be derived from Western science. Throughout the remaining years of the 19th century and well into the 20th century, many of the most important initiatives for introducing Western science continued to be taken by the Indians themselves, with the occasional assistance of non-official European residents in India. Thus, for example, although a number of British residents in India had been discussing since the 1830's the desirability of an institution which would combine the missions of the British Association for the Advancement of Science and the Royal Institution, it was left for a homeopathic physician, Dr. Mahendralal Sircar, to establish (in 1869) the Indian Association for the Cultivation of Science.<sup>112</sup> (Dr. Sircar was aided and abetted in his efforts by the Belgian Jesuit, Eugene LaFont, who had taught science at St. Xavier's College in Calcutta since 1865.) Likewise, although in 1857 the British Government had founded the Universities of Calcutta, Madras, and Bombay as examining institutions on the model of London University, it was left for an Indian Vice Chancellor, Sir Astoush Mookerjee, to establish in 1914 the University College of Science at Calcutta, the first modern school of science in India.<sup>113</sup>

Given these several initiatives taken by the Indians themselves in establishing scientific institutions in Bengal, Sen's argument linking nationalist resurgence to the growth of Western science seems reasonable.<sup>106</sup> But his conclusion that it was the uniform policy of the British government to exclude Indians from science seems as exaggerated as the counterclaim that Western science was imposed on a totally reluctant population.

In his *History of the Royal Society* Sprat noted that "the Royal Society has made no scruple, to receive all inquisitive strangers of all Countries, into its

<sup>111</sup> Collet, Sophia Dobson, *The Life and Letters of Raja Rammohun Roy*, Calcutta: Sadharan Brahmo Samaj, pp. 455-60.

<sup>112</sup> Biswas, A. K., *Science in India*, Calcutta: Firma K. L. Mukhopadhyay, 1969, pp. 49-66.

<sup>113</sup> *Sir Asutosh Mookerjee Silver Jubilee*, vol. II, Calcutta: University Press, 1922.

S. N. Bose and M. N. Saha were among the first faculty appointed to the University College. Bose's name was later to be associated with Einstein's in their joint contributions to statistical mechanics; Saha became a world renowned astrophysicist and a dominant figure in science policy in independent India. C. V. Raman, later to receive the Nobel Prize, was the first Professor of Physics at the College. The research which led to his prize was largely carried out at the Indian Association for the Cultivation of Science (ref. 112).

number.”<sup>114</sup> Jones’ Inaugural Discourse to the Asiatick Society left open the question of whether Indians would be granted membership.<sup>115</sup> But a year later he seems to have become enthusiastic about including them, noting:

“Much may, I am confident, be expected from communications of learned natives... who would eagerly, on the first invitation, send us their Mekamat and Rislals on a variety of subjects.”

“With a view... to bring their latent science under our inspection, it might be advisable to print and circulate a short memorial, in Persian and Hindi, setting forth... in a style accommodated to their own habits and prejudices, the design of our institution.”<sup>116</sup>

He went on to suggest that prizes and medals be offered for the best communications from Indians. Indeed, two communications by one At’har Atikhan of Delhi appear in the second volume of *Asiatick Researches*.<sup>117</sup> However, few Indian names appear on the membership rolls of the Society prior to the 1820’s. Though the appointment of one Babu Ram Komal Sen as Native Secretary in 1832 indicates that the Society ultimately did welcome the participation of Indians, it also suggests that Indian members may not have been regarded as having had the same status as European members.<sup>95</sup>

Jones seems to have followed Sprat in conceiving of the Asiatick Society as a thoroughly democratic organization which “will not require, I suppose, any other qualification [for membership] than a love of knowledge, and a zeal for the promotion of it.”<sup>118</sup> However, one might argue that the objectives and social organization of the Society inhibited the diffusion of Western science to the Indians.

Jones had seen a dual mission for the Society: to inquire into Man and Nature in Asia for the intrinsic worth of such inquiries, and to study whatever might be of direct assistance to the Company. Thus science in late 18th and early 19th century Bengal was the prerogative of the official government surveys whose professional character would have excluded Indians, and of a group of amateur gentlemen most of whom were civil or military servants of a company whose ultimate rationale was commercial profit. In contrast, the traditional sciences in India had been the prerogatives of the members of specialized Brahmin subcastes among whom the notion of propagating knowledge was quite irrelevant. If the

<sup>114</sup> Sprat, *op. cit.*, (ref. 34), p. 64.

<sup>115</sup> “You will not, perhaps, be disposed to admit mere translations of considerable length, except of such unpublished essays or treatises as may be transmitted to us by native authors: but whether you will enrol, as members, any number of learned natives, you will hereafter decide, with many other questions as they happen to arise.” Jones, “Discourse on the Institution of the Society,” *op. cit.*, (ref. 22), p. xv.

<sup>116</sup> Jones, “Second Anniversary Discourse,” *op. cit.*, (ref. 22), p. 413-14.

<sup>117</sup> At’har Ati Khan of Delhi, “On the Baya, or Indian Gross-Beak,” *Asiatick Researches*, vol. II, pp. 109-110; “On the Cure of Elephantiasis,” *ibid.*, pp. 149-58.

<sup>118</sup> Jones, “Discourse on the Institution of the Society,” *op. cit.*, (ref. 22), pp. xv-xvi.

Asiatick Society was an association of learned gentlemen, it was also a British club frequented by members of the ruling class. It is probable that few Indians would have felt drawn to such a club, would have felt comfortable in it, or would have understood the alleged connection between its activities and the dominant position of the distant nation which ruled them. If this is so, then only dynamic scholars such as Ram Mohan Roy, Mahendralal Sircar, or Astoush Mookerjee who were sufficiently secure in the values inherent in their own traditions could confront the British rulers on their own terms, and provide the necessary impetus for bringing contemporary science to their country.