

SANSKRIT AS VEHICLE FOR MODERN SCIENCE : LANCELOT WILKINSON'S EFFORTS IN THE 1830'S*

SREERAMULA RAJESWARA SARMA

1.1 India's first encounter with European science can be said to have taken place under the auspices of Sawai Jai Singh (1688-1742) who invited Jesuit astronomers to his court at Jaipur and also sent an embassy to Portugal in order to learn more about European astronomy. As a result of this encounter, a number of books and astronomical tables were prepared in Sanskrit at his court. The full extent of this literature on European astronomy has yet to be ascertained, since the manuscript collections at Jaipur are not completely accessible to the public.¹

1.2 More systematic attempts at spreading European science were made from the end of the eighteenth century onwards by the East India Company through their newly established colleges. Initially there was some controversy regarding the content of education to be imparted in these colleges. Some held that Indians should be taught their own literature and not be subjected to alien ideas and culture, while others, led by Mecauly, were in favour of replacing the traditional learning by European philosophy and science.

2.1 One person who steered a middle course in this controversy was Lancelot Wilkinson. He argued that the persons most likely to be receptive to modern astronomy were the *jyotīṣīs*, i.e. the traditional astronomers cum astrologers, and the best way to teach them was through the traditional Siddhānta method of discourse with which they were familiar.

2.2 Unfortunately, not much is known about Wilkinson's life and career.² He was born some time around 1805. The place of his birth was probably Cornhill, for a small memorial publication was brought out anonymously after his death from this very place.³ He seems to have come to India in about 1822 as a member of the Bombay Civil Service. After having held several minor appointments, he was sent some time before 1829 as Political Agent to the State of

* Revised and enlarged version of an invited lecture delivered at Symposium 59: *Asian Response to the Dissemination of the European Science*, in the XIX International Congress of History of Science, Zaragoza, Spain, August 1992.

Bhopal which was then being ruled by Nawab Qudsia Begum. Wilkinson tactfully resolved the differences between the Begum and her son-in-law who eventually succeeded her.⁴

2.3 Besides diplomatically disentangling the palace intrigues, he was also trying to usher in social reforms such as the remarriage of Hindu widows.⁵ He also published the *Vajrasūci*, attributed to the first century Buddhist poet Aśvaghoṣa, which forcefully argues against the Hindu caste system.⁶ Because of his success in managing the affairs at Bhopal, he was offered with a much higher pay the residency of Lucknow or the secretaryship in Bombay which he declined. Soon after, however, he died prematurely on 13 November 1841 at Sehore. At that time he was just about thirtyfive years old.

2.4 The residency of the Political Agent was not situated at Bhopal city but some twenty miles away at Sehore. Close to the residency was also a school established by the East India Company some time prior to the arrival of Wilkinson.⁷ This school gave him the opportunity to implement his method of teaching modern astronomy through Sanskrit.

3.1 Wilkinson set forth his views about teaching modern astronomy in an article entitled "On the Use of the Siddhāntas in the Work of Native Education".⁸ In this article, Wilkinson divides the Hindus of his day into three broad classes according to their cosmological views. The first class, says he, comprises of Jainas and Buddhists, the second class of the followers of the Brahmanical or Purāṇic system, and the third of the *jyotiṣīs* or "the followers of the Siddhāntas or Astronomical system".

3.2 According to Wilkinson, the first two classes have almost the same cosmology. They maintain that the earth is a circular plane, surrounded by alternate belts of seas and islands, and that the whole system is supported by the great serpent Śeṣa. The sun, the moon and the planets revolve horizontally over the plane of the earth, appearing to set when they go behind Mount Meru. The eclipses are caused by the monsters Rāhu and Ketu, and so on.

3.3 As against these superstitious beliefs, adds Wilkinson, the *jyotiṣīs* teach the true shape and size of the earth and the true theory of eclipses. The system of the Siddhāntas is that of Ptolemy with the exception of a few minor differences. Moreover, the authors of the Siddhāntas, in particular the great Bhāskara Ācārya, spare no pains to expose and ridicule the absurd notions of the Purāṇas which the majority of the people share. Therefore, the best way to disabuse the people of the absurd Purāṇic notions is to teach them the Siddhāntas written by Bhāskara and others. In support of his view, Wilkinson

quotes some nineteen verses from Bhāskara's *Siddhānta-Śiromaṇi* and translates these into English. This then is the starting point of his translation of this celebrated Sanskrit work. In these verses, extracted from the *Golādhyāya* section, Bhāskara declares that the earth is a sphere and that it is not supported by any material substance. Why does the earth appear like a plane to us? To this question, Bhāskara replies as follows: "The fact is, that one hundredth part of the circumference of the earth is or may be assumed to be a plane. The earth is an excessively large body; man is immeasurably smaller; and hence it is, that to him, as he stands on its surface, the whole earth has the appearance of being a plane".

3.4 But why go back to the Siddhāntas written several hundreds of years earlier and why not teach modern science directly through English? Wilkinson replies that to the general population the Siddhāntas have a great authority and are easily acceptable. We may quote a little extensively from his reply:

How readily may a knowledge of the science, as taught in the Siddhāntas, be recommunicated, especially to the Jotshis...? With what exultation will every man of ingenious mind amongst them receive explanations making plain and clear what is now all unintelligible and dark! They will not stop in simply admitting what is taught in the Siddhāntas. Grateful to their European Instructors for bringing them back to a knowledge of the works of their own neglected, but still revered, masters, they will...also readily receive the *additions made during the last few hundred years in science* (emphasis added).

...there can be little or nothing which we have to teach in Geometry, Surveying, and Trigonometry generally, in Geography or Astronomy, of which Bhaskar Acharya has not already given us the first principles, and for enabling us to explain which, he will not afford us many new and also the most appropriate arguments, in as much as they will be best suited to Hindu taste. And what can be more flattering to the vanity of the Hindu nation, or more grateful to their feelings and prejudices as men, than to see their own great and revered masters quoted by us with respect, to prove and illustrate the truths we propound.*

3.5 It is not known where Wilkinson learnt Sanskrit and how he came to discover the mathematical and astronomical works of Bhāskara Ācārya. But his enthusiasm for Bhāskara's writings was so

great that he began to teach them to the school pupils and also to adults at Sehore and won there many adherents. We shall describe the effects of his teaching in his own words.

I had shortly before entertained in my private service a Siddhanti who possessed a higher degree of knowledge of his profession, and having had an opportunity of making myself whilst at Kota in some degree acquainted with the Hindu astronomical books, I had communicated a knowledge of them to my own Shastri, by name Subhaji Bapu [Subbāji Rāmacandra], a man of wonderful acuteness and intelligence, and sound judgement, and to Unkara Bhat [Om̄kāra Bhaṭṭa], one of the principal Jotshis of this part of Malwa, the arguments which I had for the previous eight years of our connection in vain endeavoured to impress on Subhaji Bapu a conviction of the truth of the real size and shape of the earth and of other important physical facts, now carried to his mind the clearest conviction when shewn to be precisely the same as those of their own astronomical authors... He was lost in admiration when he came fully to comprehend all the facts resulting from the spherical form of the earth, and when retrogressions of the planets were shewn to be so naturally to be accounted for on the theory of the earth's annual motion, and when he reflected on the vastly superior simplicity and credibility of the supposition that the earth had a diurnal motion, than that the sun and all the stars daily revolve round the earth, he became a jealous defender of the system of Copernicus.¹⁰

3.6 In order to disseminate his newly acquired knowledge, Subbāji composed in Marathi the *Siddhānta-Śiromaṇi-Prakāśa* where he discussed the Purāṇic, Siddhāntic and Copernican systems. This was translated into Hindi by Om̄kāra Bhaṭṭa under the title *Bhugolasāra*.¹¹ Forwarding copies of these two books, which he himself had got printed, Wilkinson suggested to the Governor-General at Calcutta that the latter may present specially designed silver inkstands to both Subbāji Rāmacandara and Om̄kāra Bhaṭṭa for their endeavours in popularising scientific knowledge through the vernacular. The "two handsome silver emblematical inkstands" were displayed to the members of the Asiatic Society in their meeting on 7 June 1837. The inkstands represented:

a jotisi pundit seated between two globes, expounding their use from the siddhantas—and around the stand, richly

embossed, the twelve signs of the Zodiac—a Sanskrit couplet on each expressing that it was presented by the Governor-General in Council in token of approbation of the astronomical knowledge and zealous endeavours of the Pandits to enlighten their countrymen.¹²

4.1 But far more important was Wilkinson's publication programme. Seeing that very few Indians were familiar with the basic Sanskrit scientific texts, Wilkinson proposed to the Agra School-Book Society the publication of four Sanskrit texts on arithmetic, mensuration, algebra and astronomy. These texts were Bhāskara's *Līlāvati*, *Bijagaṇita* and *Siddhānta-śiromaṇi* as well as Gaṇeśa Daivajña's *Grahalāghava*, which Wilkinson undertook to edit. But the Agra School-Book Society was founded with the specific aim of propagation of modern science through the vernaculars and was reluctant to divert its funds for the publication of Sanskrit texts. Therefore, it was decided to raise the cost of printing through subscriptions and Father J. J. Moore, the Acting Secretary of the Agra School-Book Society issued an appeal for subscriptions on 26 July 1839.¹³ Soon most of the money was raised, Wilkinson himself donating Rs. 600.

4.2 By then the *Līlāvati* and *Bijagaṇita* were published from Calcutta.¹⁴ Hence it was decided to publish in their stead the *Rekhagaṇita*, a Sanskrit translation by Jagannātha Samrāṭ¹⁵ of Euclid's *Elements* through the Arabic version by Naṣir al-Dīn al-Ṭūsī. Wilkinson had discovered this translation and reported about it in the *Journal of the Asiatic Society of Bengal* in 1837. After introducing the text, Wilkinson provides here an English translation of the introductory verses and some definitions. This is followed by the Sanskrit text up to the eleventh theorem.¹⁶ However, this work was never printed under this programme. Wilkinson's premature death did not permit him to edit the text completely. It was published some sixty years later in the Bombay Sanskrit Series.¹⁷

4.3 But Wilkinson had edited for the Agra School-Book Society Bhāskara's *Siddhānta-śiromaṇi* in two parts (the *Gaṇitādhyāya* and the *Golādhyāya*) and Gaṇeśa's *Grahalāghava*. These three volumes were published from Calcutta posthumously in 1842 and 1843.¹⁸ He had also translated into English the *Sūrya-siddhānta* and the *Siddhānta-śiromaṇi*. These were brought out together in one volume in 1861 with extensive notes by his pupil Bāpudeva Śāstrī.¹⁹

5.1 Wilkinson seemed to have travelled extensively in Central India and Rajasthan and regularly conversed with the local *jyotiṣis*. He was also in touch with several scholars of Benares. Durgāśaṅkara Pāṭhaka,²⁰ an influential astrologer of Benares, and his relative—Lajjāśaṅkara Pāṭhaka,²¹ corresponded with Wilkinson. Both of them assured

Wilkinson that they followed Siddhāntic astronomy. Inspired by Wilkinson, Lajjāśaṅkara's pupil Govindadeva Śāstrī composed in 1859 a small tract in Sanskrit called *Bhūbhramaṇa* or the "Earth's Rotation".²²

5.2 Durgāśaṅkara Pāṭhaka was the author of the *Sarva-Siddhānta-Tattva-Cūḍāmaṇi*, literally "The Crest Jewel of the Essence of all Astronomical Systems". It was actually a horoscope of his patron and friend Laihna Singh Majithia, who was a general in the service of Maharaja Ranjit Singh. In this horoscope, Durgāśaṅkara displays his knowledge of Islamic astrology and takes note of the Copernican planetary model. The profusely illustrated and exquisitely illuminated manuscript copy of this work is displayed today in the King's Library of the British Museum in London. It contains, among others, star maps meticulously drawn from Islamic and European sources.²³

5.3 Elsewhere also, books began to be composed in Sanskrit on various aspects of modern science. This is not the place to enumerate all these texts, but a few cases may be mentioned. Captain Thomas Cadell, Political Agent at Alwar, encouraged one Nilāmbara Śarmā to write the *Golaprakāśa*, "Light on the Sphere", according to the European system.²⁴ In 1828 Yogadhyāna Miśra composed the *Kṣetra-Tattva-Dīpikā*, based on Charles Hutton's *Geometry*, at the instance of A.F. Troyer, Secretary of the Calcutta Sanskrit College.²⁵

5.4 In 1874, in connection with the transit of Venus,²⁶ Cintāmaṇi Raghunāthācārya,²⁷ the head assistant in the Madras Observatory, published a pamphlet in English and got it translated into several Indian languages²⁸ including Sanskrit. He was induced to write this book by the fact that

... although the class of phenomena to which the transit of Venus belongs is mentioned in Hindu treatises on Astronomy, especially Siddhanta Siromani, yet the Hindu astronomers were not really familiar with the nature of this particular occurrence.²⁹

In this pamphlet, he uses the form of dialogue, accustomed as he was in discussing thus with Hindu professors, and quotes profusely from the Siddhāntas, in order that his views may be acceptable to Hindu astronomers. The Sanskrit version entitled *Śukragrasta-Sūryoparāga* was prepared by Sundareśvara Śrautī and published from Poona in 1874.³⁰ Raghunāthācārya also led an expedition to observe the total solar eclipse of August 1868 at Vanaparti in the Hyderabad State. The court poet of the Raja of Vanaparti immortalised this expedition in a Sanskrit poem called *Suryoparāgadarpaṇa*.³¹

6.1 Wilkinson's best pupil, however, was Bāpudeva Śāstri.²² On a visit to Nagpur in 1838, he met the young Bāpudeva and brought him to Sehore to study modern astronomy under Sevārāma and himself. About Bāpudeva, Wilkinson writes as follows:

One youth possesses a wonderful talent for mathematics. He is utterly ignorant of English, but he has lately learned our letters and numbers. I lent him a copy of Euler's Algebra, and knowing our numbers and letters, he has been enabled to follow every calculation in the book—many of which are complete puzzles to me. He tells me what the question must be merely from reading the equations... I have taught him his own Astronomical System, in which he is complete... I had picked up a few gems before, and thought them, as they are, unequalled by other Sanskrit Scholars elsewhere, but this youth is destined to be the central jewel of the necklace...

He is now preparing a work on Algebra, in Maratha; in it he gives all Bhascur Acharyu's rules as given in his Beeju Gunitu, and he also generally quotes the Sanscrit text to ensure the acceptance of his work by the learned, and then he adds all that Bland, Bridge, and Euler have since made plain to us in Europe. He writes too with so much judgment that I cannot find a word even that I can displace to put in a better. Indeed he is more fit to be my gooroo (teacher) than my shishya (scholar) in all mathematical question.²³

6.2 Wilkinson secured for Bāpudeva Śāstri an appointment to teach European geometry at the Benares Government College (today Sampūrṇānanda Saṃskṛta Viśvavidyālaya) where he joined in 1842 and rose to be an eminent interpreter of Sanskrit astronomical texts. He also published Wilkinson's translations of the *Sūrya-Siddhānta* and of the *Siddhānta-Śiromaṇi* with additional notes.

7.1 We may ask, in conclusion, how far Wilkinson was successful in disseminating modern astronomy through Sanskrit. There had indeed been great opposition to Wilkinson's thesis that the Sanskrit astronomical Siddhāntas present a rational cosmology as against the absurd notions of the Purāṇas. Pamphlets were issued both for and against the thesis. Even before Wilkinson's time, in 1694, Nilakaṇṭha Caturdhara, the well known commentator of the *Mahābhārata*, attempted to show that there was no contradiction between the cosmologies of the Purāṇas and the Siddhāntas in a small tract of eighteen

verses entitled *Saurapurāṅīkamatasamarthana* or *Avirodhaprakāśa*.³⁴ Wilkinson's protégé Subbāji criticised this work in his *Avirodhaprakāśa-viveka*, which was completed on 12 May 1837.³⁵ Again in 1839, Sihoragrāmasthasabhā (the academy of scholars situated in Sihore Village) issued a pamphlet called *Bhūbhramavādanirāsa* (Refutation of the Critique of the Theory of Earth's Rotation).³⁶

Wilkinson himself admits of the opposition to his thesis in a letter written some time in 1839 to the Agra School-Book Society:

I may, however, add that, with all my care to carry along with me the convictions and concurrence of the people in what I teach, I have so far failed—that the published and unpublished writings of my pundits and scholars, have been subjects of constant attacks from the learned of Poona, Nagpur, Oojain, Muttra, Sagar and Benares...the most bigotted...have issued a ban of excommunication against all who study the Siddhants, and Astronomy.³⁷

7.2 Wilkinson had hoped, it may be recalled, that the traditional astronomers, when once they were taught the Siddhāntas properly, would readily receive "the additions made during the last few hundred years in the science". These additions were, of course, what constitute modern science and were of revolutionary nature, and the traditional Indian education never even attempted to teach them. This task was accomplished elsewhere, in modern colleges and universities through the medium of English.

7.3 Wilkinson's contribution then lies mainly in reviving the study of the Sanskrit astronomical Siddhāntas. His example of editing and translating Sanskrit astronomical texts laid, to a large extent, the foundations for the study of the history of exact sciences in India.

NOTES AND REFERENCES

- 1 The literature on Sawai Jai Singh is voluminous. For a full bibliography, see Sarma (a). See also the latest work by Sharma, esp. ch. XIII.
- 2 The Oriental and India Office Collections of the British Library, London, kindly sent me the following biographical information about Lancelot Wilkinson extracted from "Bombay Civil Servants 1750-1858":
 1822 Writer
 1824 Supernumerary Assistant to Collector of Southern Concan
 1826 Assistant to Resident at Nagpore
 1832 Extra Assistant to Resident at Nagpore
 1834 Assistant Resident at Nagpore
 1836 Political Agent at Bhopal
 Died 13 November 1841 in Bombay.

- However, this is not a definitive account. Other sources record that he died at Sehore, cf. *A Brief Notice*, p. 4; Barstow, p. 46n.
- 3 *A Brief Notice*.
 - 4 Barstow, pp. 216-218.
 - 5 His "Essay on the Marriage of Hindu Widows" was apparently reviewed in *The Friend of India* of Calcutta shortly before his death. Perhaps it is identical with his "Introduction to an Essay on the Second Marriages of Widows, by a learned Brahmin of Nagpur" [1841].
 - 6 Wilkinson (e).
 - 7 For a brief history of this school, cf. Athaley.
 - 8 Wilkinson (a).
 - 9 *Ibid*, pp. 509-510.
 - 10 Wilkinson (b).
 - 11 Also known as *Jyotiṣacandrikā*. It was apparently reprinted in 1840 from Agra. Perhaps an English translation of this work appeared from Agra in 1841 as Onkar Bhut, *A Comparison of the Puranic and Siddhanta Systems of Astronomy with that of Copernicus*, cf. Pingree, A-1, pp. 5 & 60.
 - 12 Wilkinson (b).
 - 13 For this appeal; see Moore.
 - 14 The *Līlāvati* was published for the first time in 1832 and the *Bhājanī* in 1834, cf. Pingree, A-4, pp. 308, 311.
 - 15 Cf. Pingree, A-3, pp. 56-58; A-4, p. 95; A-5, pp. 113-114.
 - 16 Wilkinson (c).
 - 17 Pingree, A-3, pp. 56-57.
 - 18 Wilkinson (g, h, i).
 - 19 Wilkinson (j).
 - 20 See Dvivedī, pp. 118-120, esp. 119, where a letter dated 3 August 1837 from Durgāśaṅkara to Wilkinson is reproduced. See also Pingree, A-3, p. 115.
 - 21 See Dvivedī, pp. 123-125; a letter from him to Wilkinson is reproduced on 123-124.
 - 22 MS no. 35616 of the Sarasvati Bhavan Library of the Sanskrit University, Varanasi. On Govindadeva see Dvivedī, pp. 131-132 and Pingree, A-2, p. 142.
 - 23 MS no. Or. 5259, described in Bendall, p. 208.
 - 24 Cf. Dvivedī, pp. 129-130; Dikṣita, p. 411; Pingree, A-3, p. 193; A-5, p. 197.
 - 25 It was published from Calcutta in 1828, cf. Pingree, A-5, pp. 336-337. Large extracts from this work are reproduced in the Sanskrit encyclopaedia *Vācas-patiyam*, Calcutta 1873-84, Vol. III, pp. 2389-2405.
 - 26 In the eighteenth century, the transits of Venus were considered to be the most accurate means to determine the solar parallax or the mean distance of the earth from the sun and therefore were observed from various parts of the world. For a detailed account, see Woolf. [See also the contribution on this very transit of Venus by Chinnici in this issue—Ed. SMRA].
 - 27 His name is variously spelt in English. He was a distinguished astronomer, the first Indian to discover two new variable stars, *R Reticuli* in 1867 and *V Cepheri* in 1878 and was elected Fellow of the Royal Astronomical Society in 1872. Cf. Raghunāthācārya (b); Dikṣita, pp. 415-416; Ansari, p. 27; Pingree, p. 380.
 - 28 The title page of the Urdu version is reproduced in Kochar, p. 26.
 - 29 Cited in Raghunāthācārya (b), p. 181.
 - 30 Raghunāthācārya (a).
 - 31 See Parakāla-Svāmī. I shall be discussing this poem elsewhere in greater detail.
 - 32 Cf. Dvivedī, pp. 126-129; Dikṣita, pp. 410-411 et passim; Pingree, A-4, pp. 241-242; A-5, p. 232.

- 33 *A Brief Notice*, pp. 8-10.
 34 Pingree A-3, p. 191; A-4, p. 157; A-5, p. 197. This work is now published under the title *Paurāṇikajyotiṣam*, ed. Indunāthaśarmā, Varanasi 1989.
 35 Dvivedī, p. 123n. Professor David Pingree informs that a manuscript copy of this work with the title *Nilakanṭhīya-bhuvanako'avirodha-samarthana* is listed in D. Sharma (ed.), *Catalogue of Sanskrit and Prakrit Manuscripts (Jodhpur Collection)*, Jodhpur 1985, no. 31562.
 36 Kielhorn, p. xxiii, no. 104.
 37 Wilkinson (d), pp. 12-13.

BIBLIOGRAPHY

- A Brief Notice*—*A Brief Notice of the Late Mr. Lancelot Wilkinson, of the Bombay Civil Service, with his Opinions on the Education of Natives of India, and on the State of Native Society*, printed for private circulation, by Smith, Elder & Co., Cornhill 1853 (with extracts from the Obituary published in the *Friend of India*, Calcutta, dated 9 December 1841).
 Ansari, S.M.R.: *Introduction of Modern Western Astronomy in India during 18-19 Centuries*, New Delhi 1995.
 Athaley, N.V.: "Kalandikā-Prakāśa of Somanātha Vyāsa" in: *A Volume of Studies in Indology, presented to Prof. P. V. Kane... on his 61st Birthday 7th May 1941*, Poona 1941, pp. 39-48.
 Barstow, H. C. (tr): *Tāj-al-Iqbāl: Tārīkh-i Bhopāl, or the History of Bhopal* by H.H. The Nawab Shahjahan Begum of Bhopal, Calcutta 1876.
 Bendall, C.: *Catalogue of the Sanskrit Manuscripts in the British Museum*, London 1902.
 Dikṣita, Śankara Bālakṛṣṇa: *Bhāratīya Jyotiṣa*, tr. into Hindi by Śivanātha Jhārakhaṇḍī, 2nd edition, Lucknow 1963.
 Dvivedī, Sudhākara: *Gaṇakatarāṅgīnī, or Lives of Hindu Astronomers*, Benares 1892, reprint: Benares 1933.
 Kielhorn, F.: *A Catalogue of Sanskrit Manuscripts existing in Central Provinces*, Nagpur 1874.
 Kochhar, Rajesh and Narlikar, Jayant: *Astronomy in India: Past, Present and Future*, Pune-Bangalore 1993.
 Moore, J.J.: "Proposal for Printing by Subscription, the following Sanskrit Works, recommended for Publication by L. Wilkinson, Esq., of Schore" in: Wilkinson (g), pp. 7-15.
 Parakāla-Svāmī, Śrīkṛṣṇa-Brahmatantra: *Sūryoparāḍadarpaṇa*, with a Telugu translation by Kappagantula Lakṣmaṇa Śāstrī, A. P. S. Govt. Museum Series No. 1, Hyderabad 1981.
 Pingree, David: *Census of Exact Sciences in Sanskrit*, Series A, Volumes 1-5, Philadelphia 1970, 1971, 1976, 1981, 1994.
 Raghunāthācārya, Cintāmaṇi (a): *Śukragrastasūryoparāḍa*, tr. into Sanskrit by Sundareśvara Śrautī, 2+19+2 pp., Jhānaprakāśa Press, Poona 1874; India Office Library Shelf Mark 2346.
 Raghunāthācārya, Cintāmaṇi (b): "Obituary," *Monthly Notices of the Royal Astronomical Society*, 41 (1881) 180-183.
 Sarma, Sreeramula Rajeswara (a): *Yantraprakāra of Sawai Jai Singh*. Edited and Translated. Supplement to *Studies in History of Medicine and Science*, 10-11 (1986-87).
 Sarma, Sreeramula Rajeswara (b): "Lancelot Wilkinson and the Dissemination of Modern Astronomy through Sanskrit," *Journal of the Faculty of Arts*, Aligarh Muslim University, Vol. I (1995-96), pp. 77-86.

- Sharma, Virendra Nath: *Sawai Jai Singh and his Astronomy*, Delhi 1995.
- Wilkinson, Lancelot (a): "On the Use of the Siddhantas in the Work of Native Education," *Journal of the Asiatic Society of Bengal*, 3 (1834) 504-519.
- Wilkinson, Lancelot (b): "[Extracts from a] letter written before June 1837 to Mr. W. H. Macnaughten," *ibid*, 6 (1837) 401-402.
- Wilkinson, Lancelot (c): "Discovery of the Rekhaganita, a Translation of the Elements of Euclid into Sanskrit by Samrat Jagannatha, under the Orders of Raja Siwai Jaya Sinha of Jaipur," *ibid*, 6 (1837) 938-948.
- Wilkinson, Lancelot (d): "[Extracts from a] letter written before July 1839 to the Agra School-Book Society," reproduced in Moore.
- Wilkinson, Lancelot (e): *Wujra Soochi*, with a preface by Lancelot Wilkinson, together with an English translation by B.H. Hodgson, and the *Tunku* [or *Laghu Tanku*] by Soobajee Bapoo, Pcmbay 1839. [Reprinted as] *The Brahmanical Institution of Caste* . . . , with an Introduction by Lancelot Wilkinson and B. H. Hodgson, 1882.
- Wilkinson, Lancelot (f): "Introduction to an Essay on the Second Marriages of Widows, by a learned Brahmin of Nagpur" [1841].
- Wilkinson, Lancelot (g): *The Gunitadyaya or a Treatise on Astronomy with a Commentary entitled the Mitakshara by Bhaskara Acharya*, ed. L. Wilkinson, Agra School-Book Society, Calcutta 1842.
- Wilkinson, Lancelot (h): *The Goladhyaya with a Commentary entitled the Mitakshara by Bhaskara Acharya*, ed. L. Wilkinson, Calcutta 1842.
- Wilkinson, Lancelot (i): *Grahalaghava of Ganesa Daivajna*, edited with the tika by Mallari by L. Wilkinson, Calcutta 1843.
- Wilkinson, Lancelot (j): *The Surya Siddhanta, or an Ancient System of Hindu Astronomy followed by the Siddhant Siromani*, translated into English with extensive explanatory notes by Pundit Bapudeva Sastri and Lancelot Wilkinson, Bibliotheca Indica 32, Calcutta 1861; reprint, Philo Press, Amsterdam, 1974.
- Woolf, Harry: *The Transits of Venus: A Study of Eighteenth-Century Science*, Princeton 1959.