



Nobles Of Knowledge: The Role Of Delhi Sultanate Nobility In Advancing Sciences

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Abstract: This paper explores the significant role of the nobility during the Delhi Sultanate in advancing both religious and secular sciences, particularly focusing on astronomy, astrology, and medical sciences. It highlights how scholars from diverse backgrounds were drawn to Delhi, where they engaged in scientific inquiry despite resistance from orthodox ulemas. Notable figures like Amir Khusrau and Sultan Firoz Shah Tughlaq championed these fields, promoting translations and the compilation of astronomical texts. The patronage extended by the nobles facilitated the study of various sciences, as astrologers provided critical guidance for political and personal decisions. Additionally, the paper examines the innovations in arts and crafts by nobles such as Mian Taha Farmuli and Mian Bhua, who contributed significantly to medicine and numismatics. Ultimately, the study emphasizes the crucial interplay between the nobility and intellectual development, showcasing how their support fostered a rich scholarly environment that shaped India's scientific heritage.

Index Terms - Sultanate nobility, astronomy, astrology, ustralab, Thakkua Pheru, Medicine.

The learned men of Central Asia and far flung regions came to Delhi and showed their utmost interest in religious and secular sciences especially in the science of astronomy, astrology and medical sciences. In view of Afif astronomy was one of the fourteen known sciences of the time.¹ Although the pursuit of astronomy was condemned by the orthodox ulemas but Amir Khusrau considered nothing short of blasphemy in the practice of astronomy. Being a rationalist theologian, Minhaj was also free from such influences and considered the study of astronomy a cultural pursuit.² The astronomers and astrologers from both the communities i.e. Hindu and Muslim were patronized by the nobles under Delhi Sultans following the Indian tradition. Amir Khusrau took interest in astronomy and astrology. His interest in the subject seems to have encouraged him to gain familiarity with the achievements made by Hindus in scientific

¹ Afif, Shams Siraj, *Tarikh-i-Firozshahi*, ed. Maulvi Wilayat Husain, Calcutta, 1891, p. 258; Siraj, Minhaj, *Tabaqat-i-Nasiri*, ed. Captain Nassau Lees, Mawlawi Khadim Hosain and Abd al-Hai, Calcutta, 1864, pp. 331-332; Siddiqui, I. H. (ed.), *Medieval India: Essays in Intellectual Thought and Learning*, Delhi, 2003, p. 86; For details see Fazila Shahnawaz, *Science of Astronomy and Astrology in Delhi Sultanate*, Narratives of the Shared Past: Gangetic Valley through the Millennium, (ed.) S. N. R. Rizvi, New Delhi, 2016, pp. 90-95.

² Minhaj, *Tabaqat*, pp. 331-332; Amir Khusrau, *Ijaz-i-Khusravi*, Eng. tr., Ahmad, Dr. Habibuddin (Managing Editor), *Writings of Amir Khusrau: 700 years after the Prophet: A 13th-14th Century Legend of the Indian-Sub-Continent: Based on annotated translation of his work*, Vol. IV, Illinois, 2007, p. 188; Afif, *Tarikh*, p. 258; Siddiqui (ed), *Medieval India*, p. 86; Idem, *Delhi Sultanate*, p. 125.

fields.³ Commenting upon interest of Indian people in various sciences, Amir Khusrau records that Brahmins were well versed in Aristotelian sciences such as Physics, mathematics, astrology and astronomy.⁴ Ibn Battuta also refers that the astrologers, versed in the science of the stars predicted to Sultan Iltutmish that one of his slaves would seize the Sultanate from the hands of his sons.⁵

Barani mentions that many expert astronomers gained fame on account of their knowledge in calculating the astronomical tables. Even the royal ladies from the harem of Sultan Alauddin Khalji awarded lavishly the Hindu and Muslim astrologers for drawing the horoscopes of the new born princes. These astrologers were held in favour, with awards both in cash and kind, for their expertise and experience by the Sultans, Maliks, Amirs, Khans, Khwajas and other notables. Thus the astrologers were found in every quarter (mohalla) of the capital city Delhi. They brought four to five hundred taqweem and two to three hundred astronomical tables/horoscopes before the nobles and other dignitaries for which they were rewarded. However, the elites of Delhi could not start any work, undertake any project or marriage could not be arranged without consulting the astrologers. Thus, they earned their livelihood by practising astrology.⁶

Amir Khusrau informs that the astrologers were consulted in the marriage of Prince Khizr Khan and Dewal Rani and fixed the auspicious time for the marriage procession, nikah and rukhsati.⁷ Likewise when Isami records marriage of Prince Shadi Khan with the daughter of Malik Alp Khan speaks about the expert astrologers who scrutinized the horoscope and find out the most auspicious moment for the conjunction of the moon and Jupiter. Thus as the hour of junction arrived, blessings came from all sides.⁸ Amir Khusrau took interest in astronomy and astrology. His interest in the subject seems to have encouraged him to gain familiarity with the achievements made by Hindus in scientific fields right from the ancient times.⁹ He mentions the tablet of clay for the astronomers to determine all events, Banda Sharaf, the skillful astrologer and Najm who claimed his expertise and attainment in astrology so high.¹⁰

Sultan Firoz Shah's interest in astronomy surpassed all other Sultans. He got Sanskrit works on astronomy translated into Persian. Some of them were dedicated to the Sultan and Dalail-i-Firozshahi that dealt with the systems of rainfall, eclipses, conjunction of stars and the impact the stars had on the earth and its inhabitants was also compiled and collected a whole library of books on astronomy.¹¹ His obsession for

³ Amir Khusrau, *Ijaz-i-Khusravi*, Eng. tr., Vol. IV, pp. 123, 144, 221.

⁴ Amir Khusrau, *Nuh Siphr*, ed. Muhammad Wahid Mirza, pp. 162, 167-168; Shaikh Abdur Rashid, *Society and Culture in Medieval India (1206-1556 A.D.)*, Calcutta, 1969, p. 166

⁵ Ibn Battuta, *Travels of Ibn Battuta*, Eng. tr., H. A. R. Gibb, Vol. III, New Delhi, 1993, p. 634.

⁶ Zia Barani, *Tarikh-i-Firozshahi*, ed. Sir Syed Ahmad Khan, Aligarh, 2005, pp. 362-365; Siddiqui, *Delhi Sultanate*, p. 88, 125-126; H. C. Verma, *Dynamics of Urban Life in Pre-Mughal India*, Delhi, 1986, pp. 220-221. Barani mentions Maulana Hamiduddin Mutriz who could be compared with the famous Greek scientists of ancient times in his knowledge in astronomy. See *Tarikh*, p. 112; Abdur Rashid, *Society and Culture in Medieval India*, Calcutta, 1969, p. 83; Siddiqui (ed.), *Medieval India*, p. 88; Nizami, K. A., *Royalty in Medieval India*, New Delhi, 1997, p. 133.

⁷ Amir Khusrau, *Duwal Rani Khizr Khan*, ed. Maulana Rashid Ahmad Salim Ansari and Muhammad Muqtada Khan Sherwani, Aligarh, 1916, pp. 154-169; Syed Sabahuddin Abdur Rahman, 'Affectionate Response to the Indian Environment', *Amir Khusrau Memorial Volume*, Delhi, 1975, p. 130; Rashid, *Society and Culture*, p. 83.

⁸ Isami, Khwaja Abdul Malik, *Futuh-us-Salatin*, Eng. tr. Agha Mahdi Husain, *Futuh-us-Salatin or Shahnama-i-Hind*, Bombay, 1977, Vol. II. pp. 503.

⁹ Siddiqui, I. H., *Delhi Sultanate: Urbanization and Social Change*, New Delhi, 2009, p. 124.

¹⁰ Amir Khusrau, *Ijaz-i-Khusravi*, Eng. tr., Vol. IV, pp. 123, 144, 221.

¹¹ Anonymous, *Sirat-i-Firozshahi*, Fascimile edition, Khuda Bakhsh Public Oriental Library, Patna, 1999, pp. 303-305; Nizami, *Royalty*, p. 133; Siddiqui, 'Science and Scientific Instruments', p. 141.

the astronomy reached such a stage that hunting of different animals was decided according to astronomical calculation.¹² The first Sanskrit manual on the astrolabe was composed by Mahendra Suri in 1370 A.D. at the court of Firoz Shah Tughlaq and in 1423 Padmanabha wrote Yantracintamani and devoted the first chapter to the astrolabe.¹³

Very little information is available regarding the interest of Saiyyid Sultans and their nobles in the science of astronomy and astrology. Yahya mentions that Sultan Mubarak entered the capital city according to the auspicious time calculated by the astronomers.¹⁴ Although no work on astronomy during the Lodi period has yet come to light, but evidences support the patronage extended to astronomers and astrologers by the Sultans and their nobles in the same manner as to all other learned men. All the three Lodi Sultans had astronomers at their courts whom they consulted on important occasions.¹⁵ Nimatallah records that nobles and the grandees of the state elevated Ibrahim Lodi to the throne after consultation with the astrologers for auspicious hour for the coronation.¹⁶

Information is available which evinced noble's interest in creative astronomy. Siraji Khurasani mentions the astrolabe in one of his qasida composed in praise of Ziyauddin Muhammad, son of Nizam-ul-Mulk Junaidi, the Wazir of Sultan Iltutmish. He writes that the eye of his intellect sees through imagination the state of affairs in the space, without the help of an ustarkab (astrolabe).¹⁷ Malik Ikhtisan Dabir in his work mentions astrolabe which implied that astrolabe had became a curiosity for the elite and a favourite instrument for the scientists. With its help they could determine the auspiciousness as well as the exactness of the time.¹⁸ Mutahhar extolled in a qasida the patronage extended by Malik Ain-ul-Mulk Mahru to the men of talent, subtleties of poetry and music were discussed, at other times theories related to the calendar and astrolabe were taken up for discussion.¹⁹

References contained in the writings of Amir Khusrau to the astrolabe indicate that he possessed technical knowledge of the instrument. His mention of astrolabe tends to suggest its popularity amongst the elites of Delhi.²⁰ It is recorded that Mahendra Suri, a Jain scholar was so impressed by the versatile functions of the astrolabe that he called it Yantraja (King of Instruments).²¹

¹² Anonymous, *Sirat-i-Firozshahi*, pp. 205-206; Nizami, *Royalty*, p. 133.

¹³ S. R. Sarma, 'From Persian to Sanskrit Texts, Transmissions and Translations', in *Contribution of the Persian Language*, (ed.) Azarmi Dukhat Safavi, Aligarh, 2004, p. 60; *Idem*, 'Yantraja: The Astrolabe in Sanskrit', *Indian Journal of History of Science*, Vol. 34, Part 2, 1999, pp. 147-148.

¹⁴ Yahya Sirhindi, *Tarikh-i-Mubarakshahi*, ed. Hidayat Hosain, Calcutta, 1931, pp. 204, 205, 206, 211, 227. Amir Khusrau also described the planetary positions on the occasion of the entry of Sultan Jalaluddin into the Capital. See Amir Khusrau, *Miftah-ul-Futuh*, p. 35.

¹⁵ Ahmad Yadgar, *Tarikh-i-Shahi*, ed. M. Hidayat Hosain, Calcutta, 1939, pp. 19, 24; Nizamuddin Ahmad, *Tabaqat-i-Akbari*, Vol. I, Nawal Kishore Edition, Lucknow, 1875, p. 327.

¹⁶ al-Harevi, Khawaja Nimatallah bin Kh. Habibullah, *Tarikh-i-Khan Jahani wa Makhzan-i-Afghani*, Eng. tr. Nirodbhusan Roy, *History of the Afghans*, Santiniketan, 1958, p. 152.

¹⁷ Siraji Khurasani, *Diwan-i-Siraji Khurasani*, ed. Nazir Ahmad, Aligarh, 1972, p. 304; Siddiqui, *Delhi Sultanate*, p. 128; Siddiqui, 'Science and Scientific Instruments', p. 142.

¹⁸ Ikhtisan, *Basatin-ul-Usn*, ff. 47a, 753b as cited by Siddiqui, *Delhi Sultanate*, p. 128; Siddiqui, 'Science and Scientific Instruments', p. 142.

¹⁹ Mutahhar, *Diwan-i-Mutahhar*, ed. Abdur Razzaq, Patna, 1998, p. 24; Siddiqui, *Delhi Sultanate*, p. 128.

²⁰ 'With the accurate yellowish astrolabe, the astrologers buried themselves in knowing the auspicious moment.' Amir Khusrau, *Aina-i-Sikandari*, ed. Muhammad Said Ahmad Farugi, Aligarh, 1917, p. 62; Siddiqui, *Delhi Sultanate*, p. 128.

²¹ S. R. Sarma, 'From Persian to Sanskrit Texts, Transmissions and Translations', in *Contribution of the Persian Language*, (ed.) Azarmi Kukhat Safavi, Aligarh, 2004, p. 60.

One of the senior Lodi noble, Daulat Khan Lodi, muqta of Lahore, was deeply interested in the subject and promoted study and research in it by reserving a place for experiments in his own palace. He had got placed a kursi (astrolabe) with a wooden rod for calculating the correct time. He posted skilled men to maintain records of the shadow of the rod on the kursi and engraved it on the astrolabe. On the basis of shadow and changing position they came to know the passage of time. However, the most expert astronomers of the time were engaged to carry out the process.²² Another noble Mian Sulaiman Farmuli also had a rod fixed on kursi (astrolabe) at his palace for calculating the time.²³ Moreover Jamali's references in his verses to Mars, Saturn, Venus, Pieces, Sun and Moon etc. show that these astronomical objects were the common knowledge of the day.²⁴

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The Sultanate nobles were known for their inventions. Mian Taha Farmuli and Mian Maruf Farmuli were experts in alchemy, made gold and silver, though Khwaja Shaikh Said Farmuli had taken an oath from Mian Taha that he would not practice alchemy. Mian Taha was well-adept in arts of calligraphy and inscribing and cutting paper and cloth.²⁹ He had technical mastery in ivory works and had made a sheet of paper from the ivory which neither break nor developed crease marks even when folded and unfolded many times. He had also invented a flag from ivory with same characteristics. This flag was whiter than the flag of cloth. He had also invented another flag from laac (gun-material/extracted from wood of a tree) which was also not broken or stuck. He also invented a cap of ivory for Sultan Sikandar Lodi. He uniquely invented an ornament for the wife of Ahmad Khan, son of Khan-i-Jahan Lodi. He carved out a khobni (ear-ring) of ivory resembling the bud of water-lily and inserted a black bee made of ebony inside the bud.

²² Rizqullah Mushtaqi, *Waqt-i-Mushtaqi*, ed. I. H. Siddiqui, Rampur, 2002, p. 65; Eng. tr., I. H. Siddiqui, New Delhi, 1999, p. 85; Siddiqui, 'Science and Scientific Instruments', p. 145.

²³ Mushtaqi, Rizqullah, *Waqt-i-Mushtaqi*, ed. I. H. Siddiqui, Rampur, 2002, p. 81; Eng. tr. I. H. Siddiqui, ICHR, New Delhi, 1999, pp. 85-86; Siddiqui, *Delhi Sultanate*, p. 132; Siddiqui, 'Science and Scientific Instruments', p. 145.

²⁴ Hameed-ud-Din, 'Indian Culture in the Late Sultanate Period', *East and West*, Vol. 12, No. 1, March 1961, p. 30; Shaikh Jamali, *Mathnavi-i-Mahr wa Mah*, ed. Husamuddin Rashidi, Karachi, 1974, pp. 2, 118.

²⁵ Khurasani, Siraji, *Diwan-i-Saiyid Siraju'd-Din Khurasani* (known as Siraja), Prof. Nazir Ahmad (ed.), Aligarh, 1972, p. 304; Siddiqui, *Delhi Sultanate*, p. 128; Idem, 'Science and Scientific Instruments', p. 142.

²⁶ Mutahhar, *Diwan*, p. 24; Siddiqui, *Delhi Sultanate*, p. 128.

²⁷ Mushtaqi, *Waqt*, p. 65; Eng. tr., p. 85; Siddiqui, 'Science and Scientific Instruments', p. 145.

²⁸ Mushtaqi, *Waqt*, p. 81; Eng. tr., pp. 85-86; Siddiqui, *Delhi Sultanate*, p. 132; Idem, 'Science and Scientific Instruments', p. 145.

²⁹ Mushtaqi, *Waqt*, pp. 181, 183; Eng. tr., pp. 198, 200.

Whenever she worn this ear-ring, it remained in the form of a bud but as soon she moved her head, it opened into flower and the bee came out and began to fly near her eyes. When she stopped moving her head, the bee went back and the flower got closed up.³⁰ Contemporary sources records that Mian Taha made an artificial pearl that has the same lustre as the original one. Sultan Sikandar Lodi estimated its value at thirty lakh tankahs, although it was made of mica and was much cheaper.³¹

Masnad-i-Ali Mian Bhua was wazīr of Sultan Sikandar Lodi. He was fond of the company of scholars and learned men. He collected books even from Transoxiana related to various subjects and engaged calligraphists to transcribe them. He invited scientists from Khurasan, Iraq, Transoxiana, and Central Asia. His special interest was in the field of medicine; thus, he selected books on medical science and compiled the Tibb-i-Sikandar Shāhi,³² which, according to Mushtaqi, was matchless in standard and value.³³

In the preface of the work, having praised God and the Prophet, Mian Bhua draws upon the good qualities of the reigning Sultan Sikandar Lodi, under whose patronage education and learning made progress. Before compiling the Mā'adan al-Shafa Sikandar Shāhi, he first sought royal permission. He then explains that the fulfilment of life's mission is to rightfully earn a livelihood and follow the law of Sharia. The fulfilment of this life mission depends on the maintenance of good health and treatment of illness through ilm-i-tibb (science of medicine).³⁴ However, in its compilation, Mian Bhua consulted various Sanskrit classics such as Ja Deskarat, Rās Ratnako, Suangdhar, Chintama, etc. He studied Sanskrit and acquainted himself with the Indian medical system ayurvedic, which he further synthesised with tibb-i-unāni. The terms and the names of the medicines, plants, and herbs were translated into Persian, and if the equivalent of any term was not found in the Persian language, it was written with its original name in the Persian script with the necessary explanation. As a result of his experimental and statistical labour, this voluminous work has been completed in 1502 A.D.³⁵

The name of a Jain scholar, Thakkura Pheru³⁶, a mint officer of Sultan Alauddin Khalji (treasurer of Khalji Sultans), stands out as a writer on a wide range of scientific subjects and also a pioneer in

³⁰ Mushtaqi, *Waqiat*, p. 177; Eng. tr., p. 194; Abdullah, *Tarikh-i-Daudi*, ed. Shaikh Abdur Rashid, Aligarh, 1954, p. 56; Nimatallah, *Makhzan-i-Afghani*, Eng. tr., Roy, p. 122 (anecdotes from *Waqiat*).

³¹ Mushtaqi, *Waqiat*, pp. 180-181; Eng. tr., pp. 197-198; Abdullah, *Tarikh-i-Daudi*, pp. 55-56; Nimatallah, *Makhzan-i-Afghani*, Eng. tr., Roy, pp. 121-122 (anecdotes from *Tarikh-i-Daudi*).

³² Also known as *Ma'adan al-Shafa Sikandar Shahi*, published from Nawal Kishore Press, Lucknow, 1877.

³³ It is based on Sanskrit classics on ancient medicine. Mushtaqi, *Waqiat*, pp. 79-80; Eng. tr. p. 83; Charles Rieu, *Catalogue of Persian manuscripts in the British Museum*, Vol. II, London, 1966, pp. 471-473; Nabi Hadi, *A History of Indo-Persian Literature*, pp. 191-192; Rashid, *Society and Culture*, pp. 171-172; I. H. Siddiqui, 'Masnad-i-Ali Mian Bhua: A Scholarly Statesman of Medieval India', *Indo-Iranica*, Vol. XX, No. 3, 1967, p. 35; Rashid, *Society and Culture*, pp. 166, 171; S. M. Jaffar, *Education in Muslim India*, Delhi, 1973, p. 56; Yusuf Husain, *Indo-Muslim Polity*, Shimla, 1971, p. 179; Syed Zil-ur-Rahman, 'Hindustan mein tibb ki Farsi tasneefat', in *Contribution of Persian language and Literature to the Composite Culture of India*, ed. Azarmi Dukhat Safavi, Aligarh, 2004, pp. 83-84; R. M. Chopra, *The Rise, Growth and Decline of Indo-Persian Literature*, New Delhi, 2012, pp. 56-57; Prof. Hasan Askari, 'Medicines and Hospitals in Muslim India', *Proceedings of Indian History Congress*, 1957, p. 170. According to Abdullah, this book was the foundation of the practice of the physicians of Hind and was thus brought into general use. See *Tarikh-i-Daudi*, ed. Shaikh Abdur Rashid, Aligarh, 1954, p. 40; Eng. tr., Elliot and Dowson, Vol. IV, Delhi, 2001, p. 451.

³⁴ Mian Bhau, *Ma'adan al-Shafa Sikandar Shahi*, published from Nawal Kishore Press, Lucknow, 1877, pp. 2-3, 8; I. H. Siddiqui, 'Masnad-i-Ali Mian Bhua: A Scholarly Statesman of Medieval India', *Indo-Iranica*, Vol. XX, No. 3, 1967, pp. 38-39.

³⁵ Siddiqui, 'Masnad-i-Ali Mian Bhua', p. 40; Hasan Askari, 'Medicines and Hospitals in Muslim India', p. 173.

³⁶ For details see, Fazila Shahnawaz, *Thakkura Pheru: A Genius of the Fourteenth Century Northern India*, Ateet- A Journal of History and Archaeology (A Peer Reviewed Journal), Vol. VII. No. 1-2, December 2018.

popularising science by writing in a simplified variety of Prakrit in the annals of the history of sciences in India.³⁷ His known works are *Kharataragaccha-yugapradhana-catuhpadhika*, *Jyotisāra*, *Dravyaparikkhā*, *Vāstusāra*,³⁸ *Rāyanaparikkha*,³⁹ *Dhātupatti*, and *Ganitāsārakaumudi*.⁴⁰ Out of these seven works, five are dated.⁴¹

Although it is not certain that when he entered into the royal services, he mentions that during the victorious reign of Alauddin, after having seen with his own eyes the vast collection of gems in Alauddin's treasury, consequently suggests that he must have joined Alauddin Khalji prior to 1315 A.D. and served the Delhi Sultans down to Ghiyasuddin Tughlaq. After completion of *Dravyāparikkha*, Thakkura Pheru occupied a high position in Qutbuddin Mubarak Shah's mint at Delhi and became the mint master at Delhi.⁴²

Dravyāparikkha (on assay and exchange of coins) is an important treatise written by Pheru on numismatics in 1318 A.D. It provides a continuous chronological list of the coin types minted in Delhi from its foundation under the Tomars to the early fourteenth century, distinguishing royal coinage on the basis not of the sectarian affinities of the issuer but of weight and precious metal content.⁴³ Pheru himself mentions that he wrote this work on the basis of his direct experience of various types of coins while he was employed in the Delhi mint. The first part of this work deals mainly with techniques of refining gold and silver and of determining their fineness, thus providing the necessary technical background for currency exchange.⁴⁴ The second part can be termed a coin catalogue and is most valuable for the monetary history of the Delhi Sultanate. It contained the described name, provenance, weight, metal content, and exchange value in terms of the Khalji currency of some 260 types of coins issued by various kingdoms of north India in the thirteenth and early fourteenth centuries.⁴⁵

Vāstusara (on architecture and iconography) was completed in 1315 A.D. and divided into three chapters. This treatise has probably served as a practical handbook for architects of Jaina temples in the

³⁷ This was a manuscript containing his seven works. A Jaina saint Jina Vijaya Muni subsequently published it in 1961 under the title *Thakkara-Pheru-viracita-Ratnapariksadi-sapta-grantha-samgraha* in the Rajasthan Oriental Series from Jodhpur.

³⁸ Bhandarkar mentioned it as *Grihvastusara* by Thakkura Pheru, son of the Parama-Jaina Chandra of Sridhamkalasa family. Composed in 1372 (Samvat?) in Kamanapura. The work is in Prakrit. See Shridhar R. Bhandarkar, *Report of a Second Tour in Search of Sanskrit Manuscripts made in Rajputana and Central India in 1904-05 and 1905-06*, Bombay, 1907, p. 38. An edition of *Vastusara* with Hindi and Gujarati translation was published by Pt. Bhagwan Das Jain in the *Jain-Vividh-Granthmala*, Jaipur, 1943.

³⁹ Thakkura Pheru, *Rāyanaparikkha: A Medieval Prakrit Text on Gemology*, ed. Sreeramula Rajeswara Sarma, Aligarh, 1984.

⁴⁰ Thakkura Pheru, *Ganitasārakaumudi: The Moonlight of the Essence of Mathematics*, Introduction, Translation, and Mathematical Commentary by SaKHYa (Sreeramula Rajeswara Sarma, Takanori Kusuba, Takao Hayashi and Michio Yano), New Delhi, 2009.

⁴¹ The earliest work, *Catuhpadika*, was written in 1291, *Rāyanapārikha*, *Jyotisāra* and *Vāstusara* in 1311 A.D.; and *Dravyāparikkha* in 1318 A.D.

⁴² For the details of his life and career, see Thakkura Pheru, *Ganitasārakaumudi*, pp. xi-xiv; Thakkura Pheru, *Rāyanapārikha*, pp. 1-5; V. S. Agrawala, 'Dhātupatti', *The Journal of Uttar Pradesh Historical Society*, Vol. XXIV-XXV (1951-52), pp. 323-335; Pushpa Prasad, 'The Jain Community in the Delhi Sultanate', *Proceedings of Indian History Congress*, Mysore, 1993, p. 225.

⁴³ Finbarr Barry Flood, *Objects of Translation: Material Culture and Medieval "Hindu-Muslim" Encounter*, New Jersey, 2009, p. 254; Peter Jackson, *The Delhi Sultanate: A Political and Military History*, Cambridge, 1999, p. 279; V. S. Agrawala, 'A Unique Treatise on Medieval Indian Coins', in H. K. Sherwani (ed.) *Dr. Ghulam Yazdani Commemoration Volume*, Hyderabad, 1966, pp. 87-101; G. H. Khare, 'Dravyapariksha of Thakkura Pheru-a study', *Journal of Numismatics Society of India*, Vol. 28, 1966, pp. 25-27.

⁴⁴ Sreeramula Rajeswara Sarma, 'Varnamalika System of Determining the Fineness of Gold in Ancient and Medieval India', *Aruna-Bharti: Professor A. N. Jani Felicitation Volume*, Baroda, 1933, pp. 369-389.

⁴⁵ Thakkura Pheru, *Rāyanaparikkha*, p. 11; Thakkura Pheru, *Ganitsarakauamudi*, p. xv.

early Sultanate period.⁴⁶ Pheru refers to twenty-five types of temples in this work, and the architectural terms and designs show that the temple architecture of both Hindus and Jains was identical. The compilation of this work indicates that Hindu religious architecture was not neglected during the Sultanate period.⁴⁷

In *Rāyanaparikkha* (on gemology), Pheru has shown his practical experience in handling gems. He saw in Alauddin's treasure a vast collection of gems.⁴⁸ It gives a detailed description of the precious stones and pearls with reference to their types, origin, size, and colour, including lustre, qualities, mode of use, evaluation, and medicinal value, i.e., relief from snake bite, rejuvenation by taking powdered stones with other medicines. Units for weighing them are also given, starting with rai and ending with taank.⁴⁹

A section of *Dhātutpatti* (on metallurgy) on the extraction of metals, though brief, is valuable for our understanding of medieval metal technology.⁵⁰

To conclude, nobles under the Delhi Sultans not only showed their interest in religious sciences but also in secular sciences. Besides, they were known for their innovations in the field of art and crafts, science and technology as well. Further from the perusal of these literary contributions of the Sultanate nobility it is clear that not only the study of Persian and Arabic but also of Sanskrit, Prakrit, Awadhi and Hindavi was encouraged. On account of the literary activities of the nobles of Delhi Sultans and their patronage to poets and scholars, significant works on different subjects were produced. The subjects chosen by these nobles and their patronized scholars were Indian tales, masnavis, qasidas (Panegyric), history, farhang literature (Lexicographical work), insha (letter writing), fiqh (Religious literature) tafsir (Commentary on Quran), fatawa (Muslim Jurisprudence), tibb (medicine), astronomy and astrology, mathematics, gemology, mining and metallurgy, numismatics and music which itself a strong testimony of their varied contributions. Thus, the nobles of the Sultanate period not only patronized the art, literature and music but were also the innovators in the field of science, technology and crafts.

⁴⁶ V. S. Agrawala, 'A Note on Medieval Temple Architecture', *The Journal of the United Provinces Historical Society*, Vol. XVI, 1943, pp. 112-117. Agrawala goes on to say that Pheru also wrote another book entitled the *Prasadamandana*, which awaits publication. *Ibid.*, p. 116.

⁴⁷ Agrawala, 'A Note on Medieval Temple Architecture', pp. 112-117; Thakkura Pheru, *Vastusara*, ed. Pt. Bhagwan Das, Jaipur; K. S. Lal, *History of the Khaljis (1290-1320 A.D.)*, New Delhi, 1980, p. 333; K. A. Nizami, *Royalty in Medieval India*, Delhi, 1997, p. 158.

⁴⁸ Thakkura Pheru, *Rayanaparikkha*, pp. 13-20.

⁴⁹ B. M. Chintamani, 'Notices of Thirteen MSS in Prakrit with Special Reference to Their Scientific and Technological Contents', *National Commission for the Compilation of History of Sciences in India, Indian National Science Academy*, New Delhi, 1971, Vol. VI, No. II, p. 170.

⁵⁰ Cf. R. K. Dube, 'Copper Production Process as Described in an early Fourteenth Century Prakrit Text composed by Thakkura Pheru', *Indian Journal of History of Science*, Vol. 41, 2006, pp. 297-312; R. K. Dube, 'The Extraction of Lead from its Ores by the Iron-Reduction Process: A Historical Perspective', *The Journals of the Minerals, Metals, and Materials Society*, 58.10, 2006, pp. 18-23.