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PROJECT REPORT

Development of amateur astronomy in independent India with special reference to West Bengal: A historical study

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Abstract
The study of the development of amateur astronomy in independent India is an unexplored research arena. Though some articles have been published, detailed research on the theme is badly needed. This research project humbly attempts to explore the subject and tries to unearth the history of multifaceted initiatives to make astronomy popular through non-professional activities. It tries to trace the history of the development of amateur astronomy in India with particular reference to West Bengal. Here, the initiatives taken by individuals and organizations in the study and development of astronomy have been evaluated. Many amateur astronomy clubs were initiated in many places in the country. The study tries to trace the growth and development of some of those clubs. In the historical context of nineteenth and twentieth centuries, it narrates the journey of amateur astronomers in their personal capacity as well as a part of their organizational activities in independent India.

Keywords Astronomy · Amateur astronomy · Amateur astronomy club · Telescope · Sky observation

1 Introduction

The project aims to trace the development of amateur astronomy in independent India with particular reference to West Bengal. It tries to focus on the history of the development of amateur astronomy in post-1947 India, though obviously, it is mandatory to look into the development of it in the pre-independence period, without which it is not possible to situate the theme. At the very outset, it was pointed out that the amateurs had begun the study of astronomy long back. They tried to explore the sky out of their curiosity and interest. But mere observation of the sky was not enough to develop the subject. It was just the beginning. Later it was created by the royal patronage of princely states, followed by the missionaries and the colonial rulers. The British colonial rulers had a specific purpose behind their activism. They tried to utilize astronomical know-how to do surveys for their economic and administrative interests.

On the other hand, the Indians of their own tried to explore the mystery of the sky by systematic observations and documentation. They did these works not for any financial gain but for their passion for astronomy. The persons who had played pioneering roles in this sphere were Jogeshchandra Roy Bidyanidhi (1859–1956), Jagadananda Roy (1869–1933), and Radha Gobinda Chandra (1878–1975). They did excel in their study of astronomy. They were sincere and serious observers of sky, variable stars, etc. They recorded their astronomical observations and interacted with others. Especially Radha Gobinda Chandra's efforts were well-acclaimed in the world of professional astronomers internationally, though he wasn't a professionally trained astronomer.

Against this backdrop, this project aims to (i) probe the journey of the amateur astronomers of independent India with particular reference to West Bengal, (ii) trace the growth and development of amateur astronomy clubs and their activities, (iii) investigate whether amateur activities inspired one to train in professional astronomy? And on the other hand, why did professional astronomers engage in amateur astronomy? (iv) explore how amateur astronomy evolved outside the domain of professionals, (v) probe the initiative taken to make a bridge between professional and amateur astronomy, and (vi) investigate the impact of amateur astronomy on society's psyche through analyzing the recent astronomical happenings with a comparative study of the older incidents.

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2 Chapters of the project

We have investigated the history of this critical aspect of astronomical studies made by different individuals and organizations in independent India with a historical background. The final report includes the introduction, history of individual initiatives, and organized efforts. An exhaustive list of books on astronomy, primarily written in Bangla, has also been collected. Another essential feature of the final report is the visual documents related to the development of amateur astronomy. In this section, the portraits of significant individuals attached to amateur astronomy have been incorporated. The logos of different astronomy organizations, representative visuals of the activities of amateur astronomy enthusiasts, documents of correspondence with the foreign counterpart, and some examples of publications that include souvenirs, periodicals, and books have also been collected. In the concluding part, we have identified the study's limitations in that we could not do justice to all crucial aspects of the study during a minimal period. For that purpose, more detailed and further research is needed. The study was carried out in the following chapter:

I Introduction
II Individuals' initiatives
III Organised efforts
IV Books on astronomy
V Visual documents
VI Conclusion

3 Discussion of the work

Astronomy is the earliest field of science (Rai et al., 2018). Since the beginning of civilization, India has been practicing astronomy (Sen, 2014). The study of astronomy began with the amateurs. The ancient people used to watch the sky and wonder to see the stars and galaxies in the sky. They have tried to explain the movements of the Sun, Moon, and planets by incorporating them into their culture. Āryabhaṭa, Brahmagupta, Varāhamihira, and Bhāskaracārya significantly contributed to astronomy in ancient India (Vijnana Bharati, 2018). The Mughal emperors took a keen interest in the development of astronomy. They patronized astronomers in their royal court (Ansari, 2014, pp. 10–18). Systematic observations developed later on.

Modern astronomy arrived in India with the Europeans as a topographical and navigational project and part of the Anglo-French geopolitical competition (Kochhar & Orchiston, 2017, p.705). In the colonial period, the English East India Company and later the British ruler developed survey activities for their commercial and political interest, which necessitated the development of astronomical observations. They established observatories in Madras (1792), Calcutta (1825), Hennessy (1884), Haig (1886) in Dehradun and Kodaikanal (1899) in Tamil Nadu (Ansari, 1975, pp. 523–530). It must be noted that the colonial rulers were not interested in promoting astronomy but in using it for cartography and meteorology (Ansari, 2011, p. 368).

On the other, the Indians showed their interest in astronomical studies, and Indian initiatives established several observatories. In the second half of the eighteenth century, Sawai Jai Singh II, Maharaja of Amber and Jaipur, built five observatories in the northern Indian cities of Shahjahanabad (Delhi), Jaipur, Ujjain, Mathura, and Varanasi (Johnson & Susan, 2015). The rulers of princely states established observatories; among those mention may be made of the observatories established by the rulers of Awadh, 1835 (Bartsch & Scriver, 2019, pp. 63–73), Travancore, 1837 (Iyer, 1937, pp.37–54) and Hyderabad, 1901 (Kochhar & Narlikar, 1995, pp. 19–20). Some private observatories were built, like Vizagapatnam, 1840[1]; Pune, 1842,[2] and Bombay, 1882. In Bengal, observatories were established in St. Xavier's College in 1875[3] and Presidency College in 1900 (Gangooli, 1906, p. 66).

Apart from these institutional initiatives and, to some extent, professional endeavors, efforts were also made by amateur persons. The term amateurish has sometimes been used as a derogatory comment. Thus we may call them non-professional instead of amateur. They practiced astronomy out of curiosity, not for any financial gain. Thomas Williams noted that today's use of the word "amateur" sometimes carries a negative connotation; as a result, it can be challenging to distinguish between true unpaid but valuable contributors to science and amateurish contributors (Williams, 2000, pp. 3–6). There are many sub-categories associated with being an amateur astronomer. These are general observers, special observers, variable star observers, astrophotographers, astro artists, astro writers, interpretative astronomers, comet hunters, and telescope makers (Mukherjee, 2002, p. 18).

Varied people practice amateur astronomy. Some are professionals in the field and do amateur activities for public understanding of astronomy. Here mention may be made of the activities of Birla Planetarium (1962),[4] where the astronomers like Amalendu Bandyopadhyay (Das, 2020) and Ramatosh Sarkar (Nath, 2021, pp. 79–82) tried to popularise

[1] This observatory was built in 1840 CE by a zamindar named Juggarow et al. (2011).

[2] Monthly Notices of the Royal Astronomical Society, *VI* (1), November 10 (1943):1.

[3] 150-year-old St Xavier's College's Observatory restored, *Times of India*, March 11, 2014.

[4] https://www.mpbirlaplanetarium.org/history/.

astronomy through slide shows and popular lectures. It provided impetus to the development of amateur astronomy. In its institutional role, the Birla Planetarium organized several training courses for amateur astronomers. Along with this, the efforts made by governmental institutions like the Birla Industrial & Technological Museum (1959),[5] Positional Astronomy Centre (1979),[6] and Different District Science Centre under the National Council of Science Museums (1978)[7] are also significant.

During earlier periods, the astronomers like Chandrasekhar Samanta (1835–1904), Jogeshchandra Roy Bidyanidhi (1859–1956), Jagadananda Roy (1869–1933), and Radhagobinda Chandra (1878–1975) did excel in their study of astronomy. They were sincere and keen observers of sky, variable stars, etc. They recorded their astronomical observations and interacted with others. Chandrashekhar Samanta was an Odia astronomer, also known as Pathani Samanta (Sahu, 2012, pp. 30–33). Night after night, he observed the stars with his bare eyes, sometimes with a bamboo telescope. He used to keep notes on palm leaves. He wrote *Siddhānta Darpaṇa*, an essential book on astronomy containing 25,000 Sanskrit verses (Naik & Satpathy, 1998, p. 33).

Professor Jogeshchandra Roy Vidyanidhi of Ravenshaw College, Cuttack, a resident of Bankura, used to practice astronomy in his spare time.[8] He compiled a notable book on the subject in the name of *Amader Jyotishi O Jyotish* (Vidyanidhi, 1903). Vidyanidhi brought Chandrashekhar Samanta's achievements into the limelight (Chakraborty, 2021, p. 87). He wrote a 56-page introduction to *Siddhānta Darpaṇa* when translated into Sanskrit (Chakraborty, 1996, p. 104). Jagadananda Roy was another well-known science writer.[9] In his workplace, Santiniketan, he enjoyed gazing at the sky. Roy also used to identify planets and stars with students in the evening.[10] He wrote a science fiction called *Shukro Bhramon* (Roy, 1895) and also wrote two astronomy books, *Graha Nakshatra* (1915)[11] and *Nakshatra Chena* (1931). In 1910, when Halley's Comet became a sensation, he wrote several articles on the subject in the *Prabasi.*[12] Halley's Comet is usually visible every 76 years. He arranged to show the comet to the students with the help of a telescope to witness this memorable moment (Goswami, 2021).

After reading these writings of Jagadananda, Radha Gobinda Chandra became more interested in astronomy. Brought up in a very ordinary family, Radha Gobinda was attracted to the stars from childhood. That interest inspired him to study the mystery of the sky. He got initial help to become an observational astronomer from Jessore lawyer Kalinath Mukhopadhyay (Biswas et al., 2011, pp. 484–485). Radha Gobinda Chandra's efforts were well-acclaimed internationally in the world of professional astronomers, though he was not a professionally trained astronomer. On his 108th birthday, the Director of the American Association of Variable Star Observers **(**AAVSO) in 1992 sent a telegram saying, "Chandra contributed 37,000 variable star observations to the AAVSO from 1920 to 1954 using the telescope loaned by AAVSO and Charles Elmer.[13] Chandra's observations were valuable and have recently been computerized" (2015).[14] Radha Gobinda was also a skilled science writer. Most of his articles on astronomy were published in the Calcutta-based journal *Prabasi, Jnan O Bijnan*, and *Desh*. Only one book *Dhumketu* by Chandra (1985) was published during his lifetime, and long after his death, *Nakshatra Jagat, Tara Chinibar Sahaj Upaya* (1996)[15] and *Souro Jagat* were published (Chakraborty, 2015, p. 80).

Professional astronomers performed amateur astronomy in their budding days. M.K.Vainu Bappu (Murthy, 2021, pp. 29–43), the father of modern Indian astronomy, got interested in astronomy through his practice in amateur astronomy during his student days. Astronomy is undoubtedly a specialized field that requires expertise (Bappu, 1974–75). The amateurs also had some training in the subject. Some had studied astronomy as a part of their B.Sc course in Mathematics, and some learned independently. There are hurdles in practicing amateur astronomy as sky-watching is the most significant part, requiring a telescope. Thus one has to procure a telescope for the purpose. It is not very easy to procure a telescope as it costs money. The amateur astronomers had difficulty in importing a good telescope from abroad or buying it in India. As a result, they had to make telescopes of their own. While making telescopes, they showed their innovative ideas. Here mention may be

[5] https://bitm.gov.in/history/.

[6] http://www.packolkata.gov.in/history.php.

[7] http://ncsm.gov.in/.

[8] See Vidyanidhi (2002).

[9] See Mahua (2022).

[10] See Dasgupta (2020, December 21).

[11] See Roy (1915).

[12] Bangla Bhashay Bijnan Charchar Ek Apurba NidarshonTnar Boi, *Anandabazar Patrika*, 1 December, 2019. https://www.anandabazar.com/editorial/unknown-story-of-jagadananda-roy-1.1077318.

[13] Telegram from the Director of AAVSO to the Secretary, Radha Gobinda Smriti Raksha Samiti, Calcutta. Cited in Ranatosh Chakraborty, *Parjabekshanmulak Jyotirbijnani Radha Gobinda Chandra*, Agartala: Jnan Bichitra, 2015.

[14] The American Association of Variable Star Observer was founded in 1911 at Harvard College Observatory to co-ordinate variable star observations made largely by amateur astronomers and to make them available to professional astronomers. In 1954 the AAVSO become an independent, private and non-profit research organisation. Today, with members in 43 countries and headquarters in Cambridge, Massachusetts, it is world's largest association of variable star observers, In Mattei (1992).

[15] See Chandra (1996).

made of Manindranarayan Lahiri, who had made a unique telescope (Chakraborty, 2016).

In 1986, Manindranarayan used his telescope to show Halley's Comet to the entire village. He founded the Lahiri Scientific Instruments Company to produce telescopes at affordable prices for educational institutions and high school and college students. He enlightened the villagers on numerous religious superstitions by showing planets, stars, eclipses, and comets (Adhikari, 2020, pp. 103–104). A person like Nikhilesh Pal,[16] an amateur, did excel in making a telescope. This man, known as 'Galileo' of Santiniketan, used to tell space mystery stories every night on the roof of a rented house in Ratanpally. In a long 25 years, he has made about 200 telescopes. In that house in Santiniketan, he has always been busy with some informal research on various planets, satellites, and stars in space.[17]

Amateur astronomers initiated amateur astronomy clubs in many places in the country. Some were personal, while others were institutional initiatives. To promote astronomical knowledge and awareness, these clubs publish books, pamphlets, and journals; organizes lectures, talks, debates, exhibitions, plays, songs, poems, and quiz.[18] Stargazing has been conducted by them throughout the night to stimulate interest in astronomy (Sule et al., 2006). The clubs promote astronomy through social media platforms such as Facebook, Twitter, YouTube, Instagram, websites, and blogs. Organizations like the Sky Watchers Association, Anusandhitsu (Inquirer), Kolkata Astronomy Centre, and Manindranarayan Astronomical Trust deserve special mention. However, many amateur clubs did not survive long due to organizational weaknesses. Even the magazines they published were closed down due to a lack of writing, funding, and enterprising persons. The persons like Manindranarayan Lahiri, Asis Mukherjee, Soumen Mukherjee, Basudev Bhattacharya, Sankar Kumar Nath, Nikhilesh Pal, Kaustuv Chaudhuri, Subhashis Chirakalyan Patra, Narayanchandra Rana, et al. had done a lot to develop the study of astronomy. They were not professional astronomers and created amateur astronomy in India. They started their work in West Bengal but did not confine their activities within the geographical boundary of the state.

There was an initiative to bridge the gulf between professional and non-professional enterprise activities. The Inter-University Centre for Astronomy and Astrophysics (IUCAA), an autonomous body under UGC, was formed at the Poona University campus in the 1980s.[19] One of the aims of IUCCA was to help amateur astronomers.[20] Jayanta Narlikar and Narayanchandra Rana were the key persons behind it. IUCAA took the initiative to promote serious observational activities among amateur astronomers. In the 1990s, a serious attempt was made to unite the amateur astronomers of India under one umbrella, and regular conferences of amateur astronomers were held in that decade. The process was initiated at the first conference of amateur astronomers, held in Pune on 11–12 January 1991 (Mukherjee, 1994, p. 70). The oldest and most active organization in India, Jyotirvidya Parisanstha, was in charge of it. One hundred fifty delegates from various parts of India attended the conference. Narlikar said, "Amateur astronomers will now be able to manage their work. We will unquestionably assist if required" (Mukherjee, 2017, pp. 192–195).

In 1992, the second meeting took place in Wardha. On behalf of IUCAA, Narayan Chandra Rana participated in this conference as an observer. He was not at all pleased with what amateur astronomers were doing. The third meeting took place in Nagpur, and the fourth conference was held in Kolkata on 21–24 January 1994. Manindranarayan Astronomical Trust was in charge of that conference, and around 400 delegates attended the meeting. The Confederation of Indian Amateur Astronomers (CIAA) was formed at that conference (Chatterjee, 2016, pp. 729–730). The formation of the confederation increased communication among amateur astronomers from all over India. Bhubaneswar, Chennai, Delhi, Shillong, Hyderabad, and Pune successively were the venue for the fifth, sixth, seventh, eighth, ninth, and tenth meets (Mukherjee, 2017, pp. 192–195). The number of people interested in astronomy increased (Roy, 1994, p. 73). The relevance of this study lies in the context of scientific temper and popular perceptions of science and scientific development in India. One of the significant aims of amateur astronomers is to promote the science of astronomy among the masses, which helps to develop scientific temperament eradicating the wrong perceptions. Here lies the significance of the history of the development of amateur astronomy.

4 Conclusion

The study of the development of amateur astronomy in independent India was an unexplored research arena. Though some articles had been published yet severe research on the theme had not been done. Through this research project, we have made this humble attempt to

[16] A Sky Watchers Delight: Mr Nikhilesh Pal, https://novakgec.wordpress.com/2020/02/23/welcome-to-my-blog/, consulted on 01.08.2022.

[17] "Durke kache ene khudeder mahakash path den santiniketaner Galileo Dadu", *Anandabazar Patrika*, 29 November 2020. https://www.anandabazar.com/west-bengal/purulia-birbhum-bankura/india-s-very-own-galileo-makes-space-a-fun-for-santiniketan-kids-dgtlds-1.1236035, consulted on 31.01.2022.

[18] *Jyotirvidya Parisanstha (April 2014–March 2015).* Jyotirvidya Parisanstha. Annual Report (April 2014–March 2015).

[19] https://www.iucaa.in/about.html

[20] See Chatterjee (2015).

explore the subject and have tried to unearth the history of multifaceted initiatives to make astronomy popular through non-professional activities. We have attempted to evaluate the role played by individuals and organizations in this process. Their significant contributions have been placed in a historical context as elaborated at the outset.

Data availability Data sharing is not applicable.

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