A Village Astronomer:
Life and Works of R. G. Chandra

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1 Introduction

The ever flourishing human society always receives dedicated service of a very few among its
members for acquiring more accurate knowledge about the phenomena of nature and thus with
the advancement of time the society enables to march forward in the direction of prosperity. The
name of late Radha Gobinda Chandra (1878 - 1975) can be proudly enlisted along with many
such dedicated souls for his untiring service rendered in the cause of development in astronomical
knowledge with his humble might.

Chandra was born on 16 July, 1878 at the village Bagchar in the house of his maternal
uncle. The village Bagchar is situated some three kilometer away from the district town Jessore.
Incidentally, Jessore, Nadia and Burdwan were contiguous districts of Bengal belonging to as
a state of undivided India. After the independence of India in 1947, major part of the district
Jessore became a part of East Pakistan which again turned into a republic country Bangladesh
since 1971. His father Gorachand Chandra was originally a resident of Burdwan district. After
his marriage with Padmamukhi¹, Gorachand remained as an inhabitant of his more affluent
in-laws.

In his maternal uncle’s house, there prevailed a very congenial environment for the all round
nourishment of any growing child like Chandra. His maternal uncle Abhaya Charan Dey was a
writer and as such he used to maintain a good library. It may be mentioned here that in later
years, Chandra had a free access to a personal library, viz. ‘Bandhab Library’ maintained by his
affluent friend Kedarnath Chandra who himself was a book lover. Chandra’s interest towards the cosmos was mainly induced by Sarada Sundari Dhar, his maternal grand-mother. She was a virtuous lady whose concept in astronomical phenomena was a matter of envy to many. She could easily identify some of the constellations, bright stars and the visible planets. Also, quite a few learned family-friends such as Jogendranath Vidyabhusan (1845 - 1904), the Editor of the Bengali magazine ‘Aryadarshan’ used to pay frequent visit to their house.

Like many other boys of middle-class family, Chandra started his education at an early age of five years in a primary school of his native village Bagchar. In course of time, he joined the Jessore Zila High School to continue his secondary education. During his studies in this school, there happened an incident that greatly influenced the young mind of Chandra to quest for the knowledge relating to cosmos. This happened in the process of preparing his lessons as a student of class six. He had to go through an essay entitled ‘Brahmanda Ki Prokando’ (How Big the Universe Is) written by a renowned Bengali writer Akshay Kumar Dutta (1820 - 1886), in his Bengali text book ‘Charupath’. The dormant urge of Chandra for acquiring knowledge on the wonder world of astronomy was vigorously kindled by the text of the said essay. Since then he intensified his studies on the object and also became more serious for making observations of the celestial objects. However, no reference of particular books which he did read or the celestial objects which he observed during this period is still unknown. At the age of 21 years, while he was still a school student, in 1899, he got married with Gobindamohini Devi who was the second daughter of Tribhagosundar Nath of Murshidabad district. Unfortunately his academic career terminated with the third futile attempt for qualifying at the Entrance Examination conducted by the University of Calcutta for the students of class ten.

Chandra spent two years after he had to give up his effort for continuing formal education. A sense of self respect made him impatient to get rid of his dependence on his family. So, after a little quest, he got a service in the Government Treasury of Jessore much to the dismay of his affluent family members. He was employed as a ‘Poddar’ (coin tester) in 1901 on a monthly salary of rupees fifteen only. His duty as a Poddar of the Treasury was to examine the genuineness of the metallic coins.

In absence of public transport system, Chandra had to travel daily, on a bicycle, all the way of three kilometer from his native village to the Treasury. Throughout his entire service period, he had been very sincere in discharging his duties at the Treasury during day-time and simultaneously he also maintained his responsibility of observing celestial objects in the role of
a world-class astronomer during night. Having completed the continuous service of 35 years, he retired from the elevated post of the Treasurer when he had been drawing a monthly salary of Rs. 175 and thus his day-time compulsion terminated.

After the partition of India in 1947, as also its state Bengal, Chandra had to leave with his family and portable belongings, his own house at Bagchar in erstwhile East Pakistan. He took shelter at Sukhchar in the district of North 24 Parganas within the Indian state West Bengal. Finally he settled in 1957 at Durgapally of Barasat which at present is the Headquarter of the North 24 Parganas district. Here he spent a penurious life until his death on 3 April, 1975.

## 2 The Guru: Kalinath Mukherjee

In a house, on the way to his working place Jessore Treasury, Chandra used to pay regular visit after the days work was over. There lived a renowned person named Kalinath Mukherjee, B. A., B. L. (see APPENDIX I). He was practicing law in the District Court of Jessore and was also known as an amateur astronomer of considerable fame.

Chandra came to know about the interest and erudition of Mukherjee in astronomy. He felt strong affinity for attending the discourses on astronomy, arranged in the house of the latter. Somehow he managed to have an access to the said discourses. Just after the end of hard work for the day at the Treasury, he had to join the discourses before returning home. He was tired by then and his hunger for food was gradually becoming stronger. But his yearning for the knowledge of astronomy was the strongest conviction to absorb him into the discussion circle. Initially, an ordinary person like Chandra used to receive cold reception from the host. As he became a regular participant of the discourses, his importance was felt by Mukherjee himself and his associates. The importance of Chandra to Mukherjee became so much that he was entrusted with the responsibility of proof-reading for the books of the latter. Even then he had to procure those works by purchasing them from the market as he was not fortunate enough to receive a complimentary copy from the author. Yet, Mukherjee was his mentor and preceptor for inculcating astronomy in his young mind.
3 Observation Of Comets

After taking part in the discourses on astronomical topics at the house of Mukherjee, Chandra realized his limitations for the study of the subject. Considering his own academic attainment, he realized that it would be possible for him to achieve the observational dexterity in astronomy rather than its theoretical intricacy involving the concepts on higher mathematics and physical sciences. Accordingly, he planned his future action and began to observe the starry night sky with keen attention. Gradually, he became acquainted with the constellations, Zodiac and bright stars by the naked eyes. He later procured a binocular to observe the still fainter celestial objects including the meteors and comets.

Chandra observed a good number of comets by the naked eyes, as also through the 3-inch and 6.25-inch telescopes acquired subsequently in 1912 and 1928 respectively. He began his performance as an amateur astronomer with remarkable observational skill on the comet 1P/Halley 1909 R1. He made observations on this comet by his naked eyes and also through binocular. This comet remained visible from 25 August 1909 to 16 June 1911 while passed its perihelion distance of $0.587208$ A. U. on 20 April 1910 at $4^\text{h} 17^m 2.4^s$ U. T.

A report on his observation of the comet 1P/Halley was recorded by Chandra in his book entitled ‘Dhumketu’ (The Comet). At that time Rai Bahadur Jadunath Majumder, Vedanta Bachaspati, M. A., B. L., C. I. E. was the most revered person of Jessore. Rai Bahadur inspired the people of the town so much that they became very enthusiastic for the observation of predicted apparition of the comet. By then, Chandra had no adequate experience for such observation. Even he had no sky atlas except the ‘Bhagola Charitam’ prepared by Mukherjee. But, fortunately he received some guidance from the two articles on the subject, published in the ‘Probasi’, a Bengali monthly magazine and authored by Jagadananda Roy (1869 - 1933). Jagadananda was a renowned science teacher of the school at Santiniketan under Viswabharati University, Bolpur founded by the Nobel Laureate poet Rabindranath Tagore (1861 - 1941) who supplied a 4-inch telescope to Jagadananda for observation of the comet 1P/Halley. By making personal contact, Chandra wanted to know the predicted time and location of the forthcoming comet from Roy who promptly fulfilled his request. By the guidance of the latter Chandra became one of the first observers to locate the comet 1P/Halley from India on 24 April 1910 with the help of his binocular. He spotted the comet for the first time as a small star-like object slightly below the Venus and to the south of the star $\gamma$ Pegasi. The comet’s tail was scheduled

$^1$1 A. U. = 149597870 km.
to occult the Venus on May 2 1910, but Chandra didn’t observe the occultation although the Venus was seen juxtaposed near the tail. He speculated that the transient part of the tail was lying on the Venus and hence the occultation was not visible. Afterwards, photograph of the comet 1P/Halley taken by John Evershed between 4.40h and 5.10h IST revealed that the transient part of the cometary tail was indeed lying on the Venus. This proves the high quality of intuition possessed by the self-taught astronomer Chandra. However, he observed the comet in its full bloom for the first time on May 10 at 3.20h IST. According to him, the tail was passing through the north of γ Aquarii, west of α Aquarii, north of β Aquarii and south of ε Pegasi. He observed some small stars through the tail to the north of γ and β Piscium. The head of the comet was lying in the second part of Pisces and the tail was extended to the last portion of Capricornus. He continued his observations on the comet which was not visible by naked eyes, maintaining exchange of experiences with Roy of Santiniketan (23\(^0\) 39’ N, 87\(^0\) 43’ E) and John Evershed (1864 - 1956), the Evershed effect discoverer, of Kodaikanal Observatory (10\(^0\) 14’ N, 77\(^0\) 28’ E). Chandra kept his vigilant eyes on the comet 1P/Halley, 1909 R1 and subsequently published two articles in details on its apparition as observed by him. Roy was very much impressed by reading those articles and advised him to procure a telescope in order to have better observations in future on the celestial objects. The former already felt very much the need of such an optical instrument and so his feeling was vigorously inspired by the advice of the latter.

In the meantime in 1912, the then Government of India enhanced the pay-scales of all of its employees. As a result, like all others Chandra also received some amount of arrear money along with his higher monthly pay. With this extra amount of money, he first made an advance payment in April 1912 to the Bernard & Co. of England for purchasing a 3-inch refracting telescope. After two months he took delivery of the telescope from the concerned Shipping Transport Authority by paying the rest amount totaling a sum of Rs. 160.63 (160 rupees 10 annas 6 pai). As the tube of the telescope was made of card-board, so it became necessary to replace it with one made of brass. For this assignment, the Broadhurst & Clerkson Co. of Calcutta were entrusted with at the remuneration of additional Rs. 100. Thus, in view of his humble monthly income, to acquire an apparently non-productive subject like the telescope in exchange of a relatively large amount of money must had been a courageous decision for a person like Chandra.

Chandra observed the comet 7P/Pons – Winnecke 1927, which remained visible from 25
February 1927 to 10 January 1928 and passed the perihelion distance of 1.039235 A. U. on 21 June 1927 at about 1\textsuperscript{h} 34\textsuperscript{m} 10.56\textsuperscript{s} U. T. On 20 June 1927 at about 15.5\textsuperscript{h} U. T. (21\textsuperscript{h} IST), he was busy with his usual scheduled programme for observations of variable stars. He suddenly noticed a nebula-like object just North-West of the bright star Vega. At that time the comet was visible on the line joining star \(\gamma\) Draconis and \(\alpha\) Lyrae (Vega) and was nearer (RA: 18\textsuperscript{h} 22\textsuperscript{m} 30\textsuperscript{s}, Dec: +40\textsuperscript{o} 30\textprime) to Vega. After consulting the handbook of British Astronomical Association (BAA), he came to know that the object under his observation was the comet 7\textit{P/Pons – Winnecke}. He observed the comet until 7 July 1927. During the period of his observation, he observed the comet to pass through the constellations Lyra, Cygnus, Vulpecula, Delphinus, Pegasus, Acquarius, Sculptor and Phoenix at a very fast speed of 40,000 km/hr. In the context “Search for meteors from the Pons-Winnecke Radiant”, the following report was published in the journal ‘\textit{Nature}’:\textsuperscript{14} R. G. Chandra of Jessore, India, also reports a fruitless search for meteors in the night of June 25. He states that Prof. Ray of Bolpur saw two meteors radiating from the neighbourhood of \(\theta\) Boötes. Here, Prof. Ray means Jagadananda Roy of Santiniketan as mentioned earlier.

The comet 2\textit{P/Encke} 1927 having period of 3.30 years, the shortest among the periodic comets, was also observed by Chandra. He searched out the said comet from the constellation Pegasus, following the instruction of A. C. D. Cromlin, the Director of BAA, and made observations until 17 January 1928. According to him\textsuperscript{2}, he detected the comet Encke in 1928 at 7 PM from Jessore with his 3-inch telescope in the Pegasus as a small nebulosity near the Andromeda galaxy (M31). During the apparition, the comet remained visible from 19 October 1927 to 3 April 1928.

Chandra was not equipped with adequate data for determining the location of a known comet. However, he succeeded to locate a long period comet at a position 1\textsuperscript{0} to the south-west of the star \(\theta\) Ceti on 9 February 1941 with the help of his binocular. The comet remained under his observation until 28 February 1941. However, he could not identify the comet. Most probably it was the long period comet \textit{C/1941 B1 Friend – Reese – Honda} with a period of 355 years. This comet remained visible from 18 January 1941 to 1 March 1941 as recorded in the Catalogue of Cometary Orbits-1999 (Catalogue 1999).

On 24 February 1943, at about 16.5 U. T. (22.00 IST) Chandra was engaged to observe variable stars with absorbed attention. All of a sudden he noticed a nebula-like object near the star \(\gamma\) Ursae Majoris. Later he could recognize the object as a comet. According to Chandra’s observation\textsuperscript{2}, the position of the comet on that date (24 February 1943) was R. A. 11\textsuperscript{h} 55\textsuperscript{m}, Dec...
+55° at 10 PM. Its speed was slow and was visible in the east as a third magnitude star. The small tail was only visible through the telescope. He observed it as a bright nebula on the line joining the star δ Ursae Majoris and γ Ursae Majoris and was nearer to the latter one. Though he could not identify the comet, yet it is possible that he might have observed the long period comet C/1942 X1 Whipple-Fedtke-Tevzadze because the ‘Catalogue-1999’ reveals that the lone comet remained visible during the period 17 November 1942 to 1 August 1943 was the comet C/1942 X1. He made serious observations on the comet until 10 May 1943 with the help of two refracting telescopes, one of his own 3-inch and the other 6.25-inch lent him by the American Association of Variable Star Observers (AAVSO). He recorded the apparent path and cometary phenomena of the comet C/1942X1 in details during the period of his observations. He noticed the variations in its brightness by measuring in magnitude scale on two occasions. First, on 8 March 1943, the magnitude of the comet reduced from the 5th to 4th and again, on 16 March 1943 from the 5.5th to 5th. These observations indicated that the cometary brightness instantly increased on those two occasions. Later from the Journal of BAA, Chandra came to know that the comet C/1942X1 was really a variable one. Also he realized from the said Journal that the phenomena of variations in magnitude observed in the comet was due to influence of solar magnetic disturbances during a sunspot maximum.

The systematic observations on comet were initiated in 1760 by Charles Messier (1730 - 1817). Until 1999, astronomers all over the world have discovered 1037 individual comets and observed to make 1688 apparitions of these comets. An outstanding observer of comets amongst the contemporary observers from the Indian sub-continent Chandra observed a good number of comets. However, he could not discover any new comet like Elizabeth Roemer (born 1929) who recovered the highest (79) number of periodic comets! The only name of an astronomer from the Indian sub-continent associated with the discovery of a comet and recorded in the ‘Catalogue-1999’ is Manali Kallat Vainu Bappu (1927 - 1982). Bappu jointly discovered the comet C/1949N1 with his teacher Bart Jan Bok (1906 - 1983) and a fellow student G. Newkirk. This comet is known as the comet C/1949 N1 *Bappu – Bok – Newkirk*.

4 Discovery Of A New Star

Chandra became interested for making observations on the planets, comets, meteors etc. His interest was so much intense that after the acquisition of a 3-inch telescope, he gradually became
an expert observer of variable stars. In course of his routine-wise observation on stars from Bagchar (23° 10' 5" N, 89° 10' 15" E), Chandra had a chance in 1918 to locate a ‘New Star’ which was actually a Nova. It was the time for setting of rainy season of the year. The light radiating celestial objects were playing hide and seek behind the running clouds of the sky. On the night of 7-8 June 1918, at about 15.5h U. T. (21.00h IST), he was watching the celestial objects from a wide open place. Suddenly, he noticed that the space around him was inundated with unusually bright but smooth light! Also light with such intensity is visible only when the bright Venus with $-4.4$ magnitude makes closest approach to the Earth. He could not justify the reason for the appearance of such unique brightness on a night before the New Moon when there was no possibility for the appearance of Moon at the said hours of night. Also, the bright planets such as the Venus and $-2.7$ magnitude Jupiter were not scheduled to rise above horizon at that time in the night sky. Yet, he was at his wits end to explain the presence of unusual brightness on the landscape at that night. As the sky was infested with passing clouds, he did not intend to make any observation in search of the source of light. Even though, the suspicion that the source of light might be a celestial object was gaining ground in his mind.

On the very next night of 8-9 June 1918, which was a New moon night, at about 16.5h U. T. (22.00 IST), Chandra easily noticed a ‘bright star’ at a glance. But the part of the sky under his observation was covered with a veil of passing clouds. He thought that the ‘bright star’ might be the star Altair, the brightest one of the Aquila constellation. After sometime, the veil of clouds ran away and as a result both the ‘bright star’ and Altair became clearly visible with glare. The ‘bright star’ (RA: $18^h\ 44^m\ 43.48^s$, Dec: $+0^\circ\ 29'\ 28.2''$), in comparison, appeared to be brighter than both the 0.77 magnitude Altair and 0.03 magnitude Vega. These three stars were located in the same part of the sky. Also, on a few successive nights, he observed the same brilliance of light in the landscape and the ‘bright star’ in the sky.

A news about the ‘new star’ in the constellation Acquila was published in ‘The Statesman’ on 12 June 1918. Chandra read the news and realized that it was the same ‘new star’ which he had been observing since 7 June 1918. As it was at the time of early stage of rainy season, the entire sky was covered with clouds causing occasional rain ever since he made his observation on the ‘new star’ in the night of 8-9 June. It is due to this reason he could not have any chance to repeat his observation on the star until 16 June. In the night of 16-17 June 1918, during the interval of 01.00h to 01.50h IST, the sky around the ‘new star’ remained clearly visible. The ‘new star’ by then attained a higher declination close to the Zenith, enabling Chandra to have a
good observation. Accordingly, he located the ‘new star’ at the south-west of 4th magnitude star θ Serpentis and north-east of 3th magnitude star η Serpentis. He also estimated the brightness of the same star and found it to be comparable to that of the 0.9 magnitude Antares.

The sudden appearance of a ‘new star’ to the naked eyes of Chandra in the night of 7-8 June 1918 from a location where none other observed before him was actually a ‘Nova’ (in Latin the word ‘Nova’ means ‘new’). This ‘new star’ of the constellation Aquila was designated by the astronomers as the Nova Aquilae 1918. Incidentally, it is the first, if not the only one, Nova whose spectrum at the pre-outburst stage had been recorded. From the records it has revealed that it was an A-type blue star of 10.5 magnitude until 5 June 1918 but suddenly its brightness flared up to 6 magnitude after two days on 7 June. Just at the very phase of changing the star of constellation Aquila into a Nova, Chandra was the first, if not the lone, observer to notice the transition phenomenon on the night of 6-7 June 1918 at 21.00h IST from Bagchar. His observation of the ‘new star’ in the following night of 7-8 June at 15.5h UT, even at a higher brightness of 0.03 magnitude equaling that of Vega, confirmed the Nova formation of the star. Although the star flared up to a maximum of −1.4 magnitude brightness it eluded him due to unfavorable sky condition.

A report on the first observation of the ‘new star’ was authored by Chandra in a widely circulated Bengali monthly magazine the ‘Probashi’ in its Sraban (July-August, 1918) issue of the same year. Jagadananda Roy from Santiniketan read this article on the observation of the ‘new star’. Understanding the importance of his observation, Roy advised him to send the report to Edward C. Pickering (1846 - 1919) of the Harvard College Observatory who might appreciate his work and properly ventilate before the astronomical community. Although Chandra was otherwise busy, yet he did not realize the importance of his work, nor did he know the formalities of reporting the discovery of a Nova. Incidentally, he was very late to report the discovery and subsequently missed the credit of becoming the discoverer of the Nova Aquilae 1918 (see APPENDIX II). However, Campbell realized his agony for missing the credit of being the discoverer of the Nova 1918. In a letter dated 24 June 1921, Leon Campbell (1881- 1951), the Chairman of Telescope Committee, AAVSO, encouraged him by writing - “You have taken up the Nova search work in a good spirit, and I hope you may be rewarded some day with a real Nova discovery”1.
5 Variable Star Observer

Though the report of Chandra on the observation of the Nova Aquilae 1918 reached six months late to Pickering, the pioneer astronomer of star classification, yet the later was impressed by the work of the former. In order to appreciate Chandra’s observational work, Pickering sent him a few valuable books, star map, Revised Harvard Photometry of Stars and some published works on the Nova Aquilae. Subsequently, Chandra was elected as the honorary member of learned societies like the American Association of Variable Star Observers (AAVSO), British Astronomical Association (BAA) and Association Francaise de Observateur (AFO), Lyon, France. Instead of paying any subscription, as a member of these associations, his responsibility was to contribute his collected observational data on the periods and instant magnitudes of the variable stars. With the help of these data, the professional astronomers were able to identify the physical characteristics of the stars, in particular, variable stars. Since 1919, his observational data were published in the Monthly Report of AAVSO5, Memoirs of the BAA6 etc.

The site from where Chandra used to collect data by making observations on stars was located at Bagchar, a remote village in the Eastern India while the majority of the other variable star observers were stationed either in Europe or in America. So, to the astronomers of these Western countries, the data sent by the lone observer from the Eastern longitude, were of very much importance. In spite of his different type of professional engagement in a Government Treasury, he not only showed keen interest to, but also devoted tremendous labour and responsibility for the regular observation of variable stars. The axes of both the eyepiece and objective lenses of his own 3-inch telescope were collinear. So to observe the objects around the zenith region, with the help of such a telescope, was physically very strenuous work 2. Overcoming all these constrains, Chandra was able to measure the brightness of several hundreds of stars in a single month with the said telescope. His observational data, as it was admitted by the contemporary professionals, were not only quantitatively rich, but also qualitatively excellent. For this achievement, time and again he received letters of appreciation from highly esteemed persons of the stature of Harlow Shapley (Director, Harvard College Observatory), Leon Campbell (Recording Secretary of AAVSO), Felix de Roy (Director, Variable Star Section, British Astronomical Association) etc. (see APPENDIX III).

The members of AAVSO were so much impressed with his work as an observer of variable

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2Incidentally, the first author experienced, how difficult is in making observations on stars with the help of this particular telescope while he was requested to keep it under his care from 1989 to 1996.
stars, in particular, that they decided to lend Chandra a more powerful telescope than the one he had. Accordingly, Leon Campbell (1881-1951), the then Chairman of Telescope Committee of AAVSO, offered a proposal for lending a 6.25-inch reflector telescope through the letter dated 12 August 1924 (see APPENDIX IV). It may be mentioned here that when the said telescope reached Calcutta, Nagendranath Dhar, owner of the telescope manufacturing company 'Dhar Brothers' took the trouble of bringing the telescope from the railway station. Not only that, Dhar carefully made an equatorial stand for the telescope and presented it to Chandra\textsuperscript{1}.

It is difficult to collect and represent the huge number of observations made by Chandra throughout his life. One can realize from the available record about the magnitude of extra labour he had to exert as an observer. In the year ending in October 1926 he made no fewer than 1685 observations, of which he made 226 observations in the month of March alone\textsuperscript{7}. Also available the number of observations he made on the 34 individual variable stars during the period 1920-24 and reported to the BAA\textsuperscript{8} (Table-1).

During the period of his long observational activities, he was able to report as many as 37215 results on variable star observation to various astronomical associations from 1919 to 1954\textsuperscript{7}. As a mark of respect to the valuable observations by Chandra, in a letter dated 3 March 1928, Leon Campbell expressed his gratitude with the following words - “The results which you are obtaining on the variables are excellent and we class you as one of our best contributors”.

6 Interactions with Professionals

In the process of variable star observations Chandra came in contact with many professional astronomers of America, Europe and India as well. It appears from the correspondence made to him, from time to time, that those professionals used to treat him as one of their respected colleagues. Among those professionals, Leon Campbell who was the Recorder and subsequently became the President of AAVSO, was very close to him. From his letter (dated 3 March 1928) it reveals that in spite of taking best care, the 6.25-inch telescope lent to Chandra by AAVSO, reached in a damaged condition. So, embarrassed Campbell who was the main architect in lending the same, wrote him how the damaged parts of the telescope could be repaired in India, or as an alternative measure, requested to send back at Harvard Observatory for the same work. Considering the enthusiasm and eagerness of Chandra to use a more powerful telescope than his own 3-inch, Campbell through the same letter, inspired him by the following words:
Table 1: Observations made by Chandra on 34 variable stars (1920 - 1924)

| VARIABLE OBSERVED         | NO. | VARIABLE OBSERVED         | NO. |
|---------------------------|-----|---------------------------|-----|
| R Andromeda              | 21  | V Cygni                   | 14  |
| W Andromeda              | 55  | R Draconis                | 16  |
| R Aquila                  | 7   | T Draconis                | 3   |
| R Arietis                 | 42  | R Geminorum               | 33  |
| R Auriga                  | 25  | S Herculis                | 3   |
| X Auriga                  | 50  | T Herculis                | 34  |
| R Bootis                  | 65  | U Herculis                | 45  |
| S Bootis                  | 53  | R Hydrae                  | 101 |
| V Bootis                  | 57  | R Leonis                  | 33  |
| R Camelopardalis          | 21  | U Orionis                 | 48  |
| X Camelopardalis          | 29  | R Pegasi                  | 7   |
| T Cassiopeiae             | 39  | R Serpentis               | 10  |
| T Cephei                  | 17  | V Tauri                   | 18  |
| s (Mira) Ceti             | 136 | R Ursae Majoris           | 30  |
| S Coronae                 | 62  | S Ursae Majoris           | 69  |
| X Cygni                   | 86  | T Ursae Majoris           | 48  |
| R Cygni                   | 19  | S Virginis                | 52  |
“The delay incidental to such an unfortunate thing is to be regretted, and I hope that you can soon have the six inch working as you have long hoped”.

Chandra also observed the occultation and lunar eclipse of 20 February 1924 and its report was published in The Journal of the British Astronomical Association. That report goes like this: Arrangements were made with two friends to observe the Lunar eclipse and occultations of stars, one to watch the minute hand, the other to watch the second hand, and both counting the minutes and seconds independently and record the time when I shouted ‘one’, ‘two’ and ‘three’ from the telescope. This was carefully done so that we get a very accurate time. Time was taken from the Jessore Telegraph Office at 4 p.m. at which hour each day the time is signaled from the Government Telegraph Office at Calcutta. The sky was very fine and seeing very good: the observations were made with naked eye, with binoculars and with a 3-inch refractor using powers of 32 and 80.

About the observation of lunar eclipse of 8 December 1929 Chandra reported it to Willarad J. Fisher of Harvard College Observatory with some quarries. Fisher replied to his all quarries in a letter dated 30 January 1930, starting with these lines:

“I have yours of December 14 with a very nice description of lunar eclipse of December 8, as observed by you at Calcutta or neighbourhood. I am greatly obliged for this. I also note your quarries about phenomena observed. To these I can return only in complete answers …”

The report of the observation of Lunar eclipse of September 26 1931 was published in The Journal of the British Astronomical Association and observation of Annular Solar eclipse of 21 August 1933 was also reported in the same journal. His short communication on ‘Rahu’ was published in the above mentioned journal in a different issue.

From a letter dated 28 August 1928, written by A. N. Brown of BAA we come to know the regularity with which Chandra used to make observation on variable stars and reported on results to the Association. A part of the said letter is quoted here:

“I acknowledge with thanks the report of 15 complete sheets of your observation of variables made this year … I have so far only just glanced over your sheets, but this glance is sufficient to show that you have again done valuable work, particularly, perhaps, in the regularity of your observations of some of the Irregular U Germinorum etc. in spite of the unfavourable weather with which you say you have had …”

The reaction of Y. M. Holborn, the then secretary of BAA, implies how indispensable were, for the professionals, the data collected by Chandra from the observation of variable stars. When
the latter tendered his resignation from the membership of BAA, then the former reacted as
follows (letter dated 30 January 1941):

“I am passing on your letter of resignation to Mr. Brown who deals with these things. But
I must say, I think it is a great pity to resign at this time when the Association is in the utmost
need of support.

Your longstanding work for the variable star section too will be greatly missed just at the time
when Lindley and others like myself with full time war duties have had to give up observing.

I beg to you as an old member to reconsider this decision of yours.”

The resignation must have been tendered by Chandra due to his old age. Still it is not
known whether the request of Holborn was complied or not.

But, the request of M. K. Bappu was complied by Chandra. The request by Bappu to get
3-inch telescope of Chandra as a loan for observation for a brief period. Eventually, Bappu
expressed his gratitude in a letter (14 August 1945) by the following words:

“It is very kind of you to offer me the loan of your 3-inch refractor with its accessories so
as to enable me to continue my observations of variable stars and I thank you heartily for the
same. I am also grateful to Prof. Campbell for kindly recommending me to you.”

For this generous act, Campbell also thanked Chandra through a letter (2 February 1946):

“It is certainly generous of you to place on loan to Mr. Bappu the three inch telescope and
I thank you on behalf of the Association as well as on my behalf.

Mr. Bappu was an excellent observer when he had to access a large telescope and I am looking
forward to future. You might be interested to know that his son is also very much interested in
variable star observing, and to date has been contributing observations made with the naked eye.”

Due to his advanced age Chandra became incapacitated to use the 6.25-inch telescope and
intended to return it to AAVSO, in compliance with the condition of its Telescope Committee.
But the authorities instructed him to transfer the telescope to M. K. Vainu Bappu, the son of M.
K. Bappu., instead of returning it back to AAVSO. Vainu Bappu received the telescope in 1958,
while he had been working as the chief astronomer, Uttar Pradesh State Observatory (UPSO),
Nainital 3. After working at the UPSO for the period 1954-1960, Vainu Bappu came to Ko-
daikanal observatory in 1960 as its Director. Latter on, in 1971 he founded the Indian Institute
of Astrophysics (IIA) at Bangalore. The said 6.25-inch telescope has been installed at the very
entrance of Cavalur Observatory (78° 50′ E, 12° 35′ N) which is under the direct supervision

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3This is now known as the Aryabhatta Research Institute of Observational Sciences (ARIS).
of IIA. A letter of Prof. J. C. Bhattacharya reveals that M. K. V. Bappu had a tremendous respect for Chandra and time and again showed this telescope to young astronomers who came to work at IIA as a mark of perseverance and self determination of its user, viz. R. G. Chandra.

7 The Legendary 3-inch Telescope

As his age advanced, Chandra began to wind up his involvement in astronomical activities. In 1959 he donated his all books and journals on astronomy together with his legendary 3-inch telescope to a neighbouring Higher Secondary School, Satyabharati Vidyapith, Barasat, Kolkata. During his lifetime, the telescope was rarely used for observation by the School authority except on a few occasions. Although some of the authorities, teachers and students used to offer felicitation to Chandra on the occasion of his every birth anniversary.

Around the period 1970, in connection to the Naxalite movement, a section of misguided youths started to destroy the office and library of the schools in West Bengal. In one such raid, many astronomical journals and valuable books of the said School, including those donated by Chandra, were destroyed. However, apprehending an untoward incident to occur, the authorities of the School had the wisdom to shift the 3-inch telescope in a outside safe custody. Thus, the legendary telescope was saved from the devastation. Chandra had to bear such terrible shock before he died on 3 April 1975.

The said legendary telescope remained out of the premises of the School for a long time. The first author, having completed sometime earlier a senior fellowship under the University Grants Commission scheme for writing University level text books, joined the School on 1 September 1981, as an Assistant Teacher of mathematics. Around the time the comet 1/P Halley made its perihelion passage on 9 February 1986, he was requested by the International Halley Watch organization to report on its observation. Fortunately, the Department of Applied Mathematics, Calcutta University, offered the service of their 3-inch refractor to the first author, enabling him to guide the students and teachers of both the Calcutta and Visva-Bharati Universities for their observation of the comet. But he was unable to use the legendary telescope of the School for the observation of the comet 1/P Halley, as it was still in the possession of safe custody.

However, due to concerted effort of the authorities and teaching staff, along with the generous cooperation of Prof. Amulya Bhusan Gupta, it was possible to bring back the said telescope under the supervision of School by the end of 1986. At that time, the comet 1/P Halley was
receding to distances much beyond the reach of the 3-inch telescope.

During this time, Dr. Ranatosh Chakraborty, a college teacher and inhabitant of Barasat, took initiative in ventilating the achievements of Chandra as an observational astronomer, by writing book and articles in both the national and foreign journals and also propagating talks through the radio and television transmissions. He was instrumental in founding the ‘Radhagobinda Memorial Society’, Barasat, which organized his several birth anniversaries starting from 1986 at different local institutions as also in Kolkata. On almost every occasion the legendary telescope was displayed for public viewing. Later, the telescope was also displayed at the Birla Industrial and Technological Museum, Kolkata in 1989 and again on the occasion of the Fourth All India Amateur Astronomers’ Meet at Presidency College, Kolkata in 15-16 January 1994.

In the meantime Kalidas Chandra, the eldest son of Chandra, requested School authorities for the proper maintenance and use of the telescope donated by his father. As an effect the first author was entrusted with those responsibilities from 13 April 1989. Having received the legendary telescope with deep reverence to the historical instrument, he carefully made all the component parts cleared and suitable for making observations. Since then, the telescope was displayed at School and other institutions for making observations on every possible celestial event like the eclipses, planetary transits over the solar disc, meteor showers and so on. After his retirement the author returned the telescope once used by Chandra with all its components intact to the then Teacher-in-Charge of the School on 27 June 1996.

8 Calendar Reformer Chandra

An ardent astronomer Chandra noticed the age old enigma in the Indian calendars known as Panchang or Panjika. The enigma was that the timings predicted in the contemporary Panjikas for the occurrence of celestial events were not in conformity to the actual observations. In some cases, such enigma prevails even today. As the people are supposed to observe their respective religious rituals depending on the predictions from Panjikas, so the anomaly in timings always creates confusion among the populace. Most of the Panjika makers were accustomed to use the reference elements set in the Siddhanta Jyotisha calendar reformed way back in 400 A.D. At that time, ancient Indian astronomers formulated some astronomical principles to determine and successfully predict in their almanac the correct timings of the celestial events. These events are the markers for observance of religious rituals besides the day to day activity of the people.
They also realized that the reference point for the calculation of time, termed as the Vernal Equinox, is not fixed. So they advised the future Panjika makers to make adequate adjustment in the timings from time to time in order to maintain correctness of their predictions.

Since the concept of gravitation and its celestial manifestations were yet to know at that time, so the ancient Indians could not explain how the Vernal Equinox recedes. At the advent of gravitation it was realized, in 1687, that the precessional motion of the Earth is mainly responsible for the lagging of equinoxes called the precession of equinoxes. Subsequently, it was also found that the Vernal Equinox recedes towards the west along the ecliptic to the extent of 50.28'' causing a delay of 20'' 24.32'' per year, for the occurrences of all celestial events on the Earth.

The successive Panjika-makers of India maintained their traditional orthodox attitude in preparation of their almanacs on the basis of timings set during the Surya Siddhanta period. Surya Siddhanta is an astronomical compilation, the writing of which started from the Fourth century. They thought that as because these timings were set by ancient sages, so it must be pure for the purpose of religious observances and thus they deliberately paid no heed to the advice for adjustments. Such orthodox practice prevailed in the Seventeenth Century, even after the realization of the precession of equinoxes and also continued to the Twentieth Century! As a consequence, the predicted timings of the celestial events published in the Panjikas, gradually continued to recede from the observed ones by larger interval of time than ever.

There were public demands, from time to time, to make the timings predicted in the Panjikas be corrected, as very often those were not correlated with the actual observed ones. During the later part of the Nineteenth Century, the erudite people from all over India, like Lokmanya Bal Gangadhar Tilak (1856-1920), Pandit Madan Mohan Malabya (1861-1964) of Kashi, Mahamohapadhyay Chandra Sekhar Singh Samanta (1835-1904) of Orissa and Acharya Jogesh Chandra Roy Vidyadridhi (1859-1956) of Bengal began to advocate for the reformation of Indian calendars.

In contemporary Bengal there were two Panjikas of which one was Gupta Press Panjika published from Kolkata and the other Kalachand Panjika from Sreerampore. Among many others Sri M. M. Bandyopadhyay, a Jamider of Talinipara, also pointed out the discrepancies contained in these Panjikas and suggested for the preparation of corrected ones. In compliance to the suggestion, Sri Madhab Chandra Chattopadhyay (1829-1905), a retired engineer began to publish Visuddha Siddhanta Panjika (VSP) from 1890 on the basis of British Nautical Almanac

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4Corresponding Bengali era 1297
The BNA was prepared on the basis of actually observed motions of the celestial objects and considering their effect due to the precession and nutation of the Earth on their timings. Thus, the predicted timings of the celestial events published in VSP had been in close conformity with their observed ones.

It was not possible to elucidate the vast populace about the astronomical aspect of Panjika making, nor were they able to come out from the clutches of age-old traditional belief. So the newly reformed almanac could not gain enough popularity and as such financial patronage to compete with the traditional Panjikas. At this juncture of time Chandra began to write articles, in the well circulated journals, on the discrepancies observed in the predicted timings of the traditional Panjikas. As a result, the traditional Panjika-makers cleverly began to use the timings from BNA, for predicting the occurrences of such celestial phenomena as the eclipses, New and Full Moons, since those celestial events could be easily verified by naked eyes. But for predicting the other celestial events like the Tithis and Nakshatras they maintained their devotion to the traditional method of calculation. In this manner, in the name of religious purity they continued predicting wrong timings in their publications to the extent of 5 to 6 hours as because these timings cannot be verified by the common people without having advanced knowledge in astronomy and observational dexterity.

In his relentless effort for the reformation of Indian calendars, Chandra not only published many articles like the one in October-November, 1927 (Kartik, 1334) issue of Prabasi, a Begali monthly magazine, but also joined the ‘Jyotish Parishad’ as a member. The Jyotish Parishad was founded by Indra Nath Nandi as a learned organization in 1930-31 (1337 Bengali era) with an objective of popularizing astronomy in general.

But, in particular, the members of the organization became very active to achieve success in the effort of the calendar reformation as their contemporary subject. On 22 December 1936, the members of the Jyotish Parishad observed the ‘Chandra Sekhar Day’ in commemoration of the birth centenary of Chandra Sekhar Singh Samanta, whose date of birth was 13 December 1835. Chandra Sekhar was an eminent astronomer and an active reformer of traditional calendars. In the said centenary celebration which was held in the premises of Sanskrit College, Kolkata, Chandra presented an erudite article on the reformation of contemporary Panjikas. His said article was so impressive that subsequently it had been published in the Education Gazette for its wide circulation.

With the passage of time, the movement for reformation of Indian calendars had been
gaining momentum. As a result, immediately after the independence, Government of India appointed in 1952 the Calendar Reform Committee (CRC) under the Chairmanship of world famous astrophysicist Prof. Meghnad Saha, F. R. S. (1893-1956). On invitation by the CRC, Chandra placed his suggestions through a letter dated 3 April 1953. The summery of his suggestions as printed in the report of CRC are given below:

(i) Advocate ‘Nirayana’ system of calculation;
(ii) Initial point to be taken 180° from the star Spica;
(iii) Correct calculation to be adopted in the calendar;
(iv) 21 March should be called as ‘Mahavisuva Din’ and not ‘Mahavisuva Samkranti’.

The CRC committee submitted its report with recommendations in 1955 to the Government of India. As per recommendations, the Government started work for preparation of the Indian Ephemeris and Nautical Almanac. This work was started in a newly created section ‘Nautical Almanac Unit’ attached to the Regional Meteorological Centre, Kolkata, with Nirmal Chandra Lahiri (1906-1980) as its first Officer-in-Charge. This newly created ‘Unit’ published its first issue of ‘The Indian Ephemeris and Nautical Almanac for 1958’ much earlier in March 1957 accompanying the issues of ‘Rashtriya Panchang’ in English and 11 other Indian languages, so that the Panchang makers all over India may use for annual publications for the succeeding year. These annually published Ephemeris and Panchangs contain the actual timings of all the forthcoming celestial events which are useful for the scientific, social and religious purposes. Since 1979, the said ‘Unit’ became an independent institution, ‘Positional astronomy Centre’ with a Director as its head. This ‘Centre’ in its turn continues to publish the Panchang annually, but at an increased number of Indian languages to 14, apart from the Ephemeris. That the Indian almanac makers can now confidently publish correctly predicted timings of the celestial events through their Panchang or Panjika, is the consequence of untiring effort of the calendar reformers like Chandra.

9 Achievements

The transformation of an inquisitive boy Chandra, of a remote village of united Bengal, into a world class astronomer, is itself a great achievement. He had to discharge his domestic responsibilities as the father of four children and professional duties as a staff of Government Treasury, while he voluntarily engaged himself as an untiring observer of the night sky with all serious
commitments of a professional astronomer. He made observations, initially, on the celestial
incidents like the shooting stars or meteors, apparition of comets, occurrence of eclipses and
published his observational reports on these in the national journals. But, later on his collected
data from his observations on variable stars were of so precious scientific value that these were
reported in the international astronomical journals. His collected observational data were used
by the professional astrophysicists for the study and research on various physical characteristics
of stars. Thus the night-sky watcher Chandra stood out more gloriously as an astronomer than
his any other role of the family head or Treasury Officer.

It was not easy for the general people to realize and appreciate the quality of academic work,
on such rarely studied subject astronomy, accomplished by Chandra. So, only when the news
concerning a 6.25-inch telescope would be lent to him, was conveyed by the AAVSO through
the letter dated 12 August 1924 by Leon Campbell, then the enthusiastic goldsmith community
of Bengal accorded overwhelming felicitation, in 1925, to its fellow member Chandra.

However, Chandra was recognized, time and again, as a world-class important observer
from the East by the very professionals for regularly contributing observational data on the
variable stars. On request, he used to contribute these data to the astronomical observatories
of Europe and America for the publication in their respective bulletins and journals and use of
the professionals as well. His observational findings were so unique and fundamental that he
received many spontaneous appreciations and acclamations from the world class astronomer.
One such appreciation, cited below, was accorded by Harlow Shapley (1885-1972) of Harvard
College Observatory, through a letter dated 12 December 1950:

“The American Association of Variable Star Observers, with Headquarters at the Harvard
Observatory, is honoured to salute you as one of its important contributors from abroad ...”

He was even rewarded by getting elected as the honourary member of several learned soci-
eties and enlisted as the subscriber of their respective bulletins or journals published by these
institutions. As of 1953, Chandra was a member of each of several such societies, a few of which
are listed below:

1. American Association of Variable Star Observers, Harvard College Observatory, Cambridge,
   38 Mass., U. S. A.
2. Association Francaise de Observateurs d’Eloite Variablese, a l’ Observatoire d’Lyon, France.
3. British Astronomical association, London, England.
4. American Museum of Natural History, New York, U. S. A.
Perhaps ‘Officer d’Academie, Republique Francaise’ was the only reward, as such he received from the Government of France through its Consulate General of Kolkata, on 1 August, 1928. The Consulate General sent to Chandra a diploma and a badge related to his reward along with the letter:

Consulate General de la Republique Francaise, Calcutta

Dear Sir,

In continuation to my letter dated 26-3-28, I have the honour to inform you that the Ministry of Education has decided to confer upon you the distinction ‘Officer d’Academie’.

You will find herein enclosed the Bravet and the badge of this distinction for which I shall be obliged to receive a receipt.

I am pleased to convey to you my best congratulations for the token that has been granted to you in recognition of your valuable services to the Observatory of Lyon.

Yours faithfully,

Mr. R. G. Chandra
Bagchar, Jessore

R. Lazonies,
Consulate General for France

Having received the said award, Chandra became so much complacent that he used to write O. A. R. F. (‘Officer d’Academie, Republique Francaise’) after his name. Also, inspired by the title, ‘A Village School master’, of a poetry written by Oliver Goldsmith (1730-1774) in his school text book, he preferred to be introduced as ‘a Village Astronomer’.

Chandra wrote quite a few books on astronomy in Bengali. Out of these only ‘Dhumketu’ (The Comet) was published in 1953 during his lifetime by the Puthipatra (Calcutta), Pvt. Ltd. The second one ‘Tara Chiniber Upaya’ (How to recognize the stars) was published in 1996 by the Bangiya Bijnan Parishad, Calcutta and the rest, ‘Sourajagat’ (The Solar System), ‘Nakshatra Jagat’ (The World of Stars) and ‘Sabita o Dharani’ (The Sun and The Earth) remained unpublished.
10 Relevance of Chandra

Even after leaving his ancestral house at East Pakistan after 1947 and taking refuge in parted India, Chandra was able to continue his activities as an observer astronomer until 1954. In course of time, due to old age, he gradually became incapacitated for performing observation through his telescope. Thus his interactions with the astronomers all over the world, to whom he was so well known, began to wane. Consequently his image as an active astronomer squeezed into the physical presence within his locality at Durgapally. The authorities, teachers, students and guardians of his neighbouring school Barasat Satyabharati Vidyapith were the only people remained for interaction by paying respects on his every birth-anniversary.

During his lifetime, Chandra as an astronomer, was known to a very few people of his country. Even most of those who knew him, could not realize his worth as an astronomer. In this respect, Prof. Apurba Kumar Chakrabarty, a mathematics teacher of Mahisadal Raj College, Midnapore, was perhaps the first person known, to assess his worth. Through an article published in 'Modern Review', he narrated how a person without formal education, financial assistance and any kind of patronage can achieve excellent knowledge by observation for the study of astronomy. Such knowledge was essential for research work of the contemporary world-class astronomers.

Another scholar, Prof. Amulya Bhusan Gupta, Department of Physics, Indian Statistical Institute, Calcutta could fully realize the importance of work done by his next door neighbour Chandra. Prof. Gupta had ample opportunity to be acquainted with the life and work of his distinguished neighbour for years together. So, after the demise of Chandra in 1975, a competent person like Prof. Gupta recorded an obituary which was published in ‘Sakswar’, the magazine of Barasat Satyabharati Vidyapith. From the said obituary, it reveals that Prof. Gupta made some futile attempts to draw the attentions of concerned authorities for according national recognition to such an extraordinary work done by an ordinary ‘Village Astronomer’.

The extraordinary achievements of Chandra were brought into limelight more widely than ever before during the last two decades of the 20th century by Dr. Ranatosh Chakrabarty, Surendanath College, Calcutta. Dr. Chakrabarty, also another neighbour of the former, contributed many articles on Chandra in the dailies and journals published from India and abroad. He also presented talks on the same subject through the radio and TV transmissions, besides delivering invited lectures at different educational institutions at Calcutta and its neighbourhood. Dr. Chakrabarty and Prof. I. B. Sinha, a retired professor of Physics, West Bengal Government
Colleges, also a neighbour of the former, jointly edited in 1985 the second edition of the book ‘Dhoomketu’ (The Comet) which was originally authored by Chandra. Dr. Chakrabarty also edited another book written by Chandra entitled ‘Tara Chini ber Sahaj Upay’ (The easy means to recognize stars) and was published by the ‘Bangiyo Bijnan Parishad’, Calcutta, in 1996. Also, Dr. Chakrabarty wrote himself a book on the life and works of the village astronomer Chandra published by ‘Puthipatra’.

In order to perpetuate the memory of the astronomer, Dr. Chakrabarty and Prof. Sinha instituted the ‘Radhagobinda Memorial Society’ at Nabalpally, Barasat which is the home town of these three. The society organized several lectures and exhibitions at schools and colleges in and around Calcutta. During this period, a good number of articles on the achievements of Chandra were contributed to the popular journals of Bengal by renowned writers like Arup Ratan Bhattacharyya, Amalendu Bandyopadhyay and others.

As an impact of these efforts, very significant steps were taken by different learned institutions of Calcutta. Birla Industrial and Technological Museum, in collaboration with Indian Astronomical Society and Radhagobinda Memorial Society, organized an exhibition on the astronomer for a period of about two weeks from 18 July 1989. This exhibition was accompanied by a few lectures and display of the historic 3-inch telescope of Chandra. In this exhibition, numerous panels depicting available pictures of Chandra, photo copies of correspondences made by renowned world-wide astronomers with him and many other papers related to his astronomical activities were also exhibited.

The West Bengal State Book Board published (March 1990) a special issue of ‘Ganit Char-cha’, a quarterly journal on mathematics, to commemorate the contributions of Chandra made for the enrichment of astronomy. A section of eminent scholars of the subject highlighted in this special issue about his humble life and role in collecting astronomical data as a lone contemporary observer from Eastern India. The Editor rued in his editorial that the birth centenary year 1978 of Chandra passed unnoticed from his own countrymen. Usually such an occasion offers the populace an opportunity to be acquainted well about the life and contribution of a celebrity to the society. From this point of view, the Editor expected that the said special issue may compensate, to some extent, the advantages of the missed centenary celebration.

The enchanting scientific works of Chandra also attracted attention of many people from Bangladesh. At the onset of 21 century, the authors such as Fakray Alam (Dainik Bhorer Kagaj, 02.01.2000), Naimul Islam Apu (Dainik Pratham Alo, 18.07.2004) and Rafikul Islam Sujan
(Dainik Samakal, 16.07.2006) contributed several articles on R. G. Chandra in the newspapers. Amongst these, Apu has also authored a book entitled ‘Banglar Jyotirbijnani Radhagobinda Chandra’\textsuperscript{16}. In order to write the said book, Apu visited both the ancestral house of Chandra at Bagchar, Bangladesh and his last residence at Barasat, India. In quest of information about the ‘village astronomer’, Apu met his grandson Sisir Kumar Chandra and one of the authors of the present article Sudhindra Nath Biswas, a retired and National Awarded teacher of Barasat Satyabharati Vidyapith. During his visit, Apu recorded a short speech of Biswas on Chandra and arranged for transmission through Bangladesh Radio (perhaps in 2006).

Another enthusiastic scholar Prof. M. A. Aziz Mia, a retired college teacher from Bangladesh, had a similar mission. He wrote a scholarly article about Chandra in the special issue of ‘Telescope-2’ published from 7, Dhanmundi, Dhaka - 1205 on the occasion of International Year of Astronomy, 2009.

11 Epilogue

To end the discussion, let us recall the wellknown proverb “some are born great, some achieve greatness and greatness are thrust upon some others”. The village astronomer Chandra certainly belonged to the second category with respect to his greatness. Indeed he overcame his limitations, both as an academician and an observational astronomer by sheer zeal, enthusiasm and perseverance. As a variable star observer, his meticulously collected data helped the professional astronomers to develop theories regarding the variability of the stars while as a comet observer he not only observed the beauty of the comets, but also showed his scientific attitude by noting down the day to day specific location of the comets. Being undeterred by missing the rare honour of a nova discovery, he went on performing the tedious job of night sky observation. This proves that in respect of motivation and dutifulness he was at par with the professional astronomers. This marks the upliftment of Chandra which he achieved through his own effort and nothing else. In this context it will be very relevant to quote “Radha Gobinda Chandra’s (1878 - 1975) introduction to modern astronomy came not through his European employers, but through Bengali texts, and he became a researcher, though a modest one.”\textsuperscript{7} This will serve as a beacon of light to future generations of astronomers - both amateur as well as professional.
Kalinath Mukherjee was born in a middle-class Brahmin family of the village Jaidia in the district of Jessore. He had his undergraduate education from Krishnanagar College through which he was conferred the degree of B. A. by the University of Calcutta in 1872 with honours in mathematics, philosophy and Sanskrit. He continued his studies with the subject Law and was again conferred the degree of B. L. by the same university in 1873. While he was a college student, Mukherjee had the opportunity to come in close contact with Sir M. J. Herschel, M. A., and Bar-at-Law. Herschel was the then District and Session Judge of Nadia and was posted at its Headquarter Krishnanagar. He was the descendent of a world famous family having great astronomical background as he was none other than the son of Sir John Herschel (1792 - 1871) and the grandson of Sir William Herschel (1738 - 1822) who were the two pioneer astronomers of their times in their own rights. Mukherjee had the privilege of getting immense inspiration and guidance from such a person as M. J. Herschel for the study of astronomy.

After obtaining the B. L. degree, Mukherjee started to practice Law at the bar in his home district town Jessore. Soon he succeeded in his profession and became an eminent lawyer. Yet, astronomy remained the subject of his great interest and devotion. He used to visit his native village Jaidia, far away from the district town, in every week-end for sky observation. There he constructed a small observatory and named it as the Ripon Palli after the name of Lord Ripon who was the Viceroy of India (1880 - 1884). Mukherjee used to contribute articles on astronomical topics in the leading journals of Bengal and became a popular writer of the same topics. Subsequently he published in 1901 a sky map entitled ‘Bhagola Charitam’ written in Sanskrit. He authored another book under the title ‘Tara’ (The Star) in Bengali and published it in the year 1902. Also in 1905 he authored a book entitled ‘Popular Hindu Astronomy’ written in English with extensive quotations from classical Sanskrit literature, viz. Vedas, Ramayana, Mahabharata, Puranas etc. Mukherjee was also so much committed as an amateur astronomer that at the end of day’s professional duties, he used to arrange meetings at his residence. The said meetings were attended by the persons interested in astronomy to discuss the topics related to the celestial bodies.
APPENDIX II

The discovery of Nova Aquilae was first reported in Nature in its 13 June 1918 (page 285) issue by F. W. Dyson. Actually, Dyson reported on the basis of intimations he received on the independent discoveries of the Nova made by several observers. In his report Dyson states: “Apparently, the first observation was made by Miss Grace Cook at Stowmarket when on the watch for meteors at 9h 30m P.M., G.M.T. on June 8”. After four months, John Evershed claimed: “In Nature of June 13, I note that the earliest observation of Nova Aquila in England was made by Miss Grace Cook at 9h 30m P.M., G.M.T. on June 8 and the magnitude was estimated as equal to Altair. In India the star was seen and recognized as a nova about five hours earlier by Mr. G. N. Bower in Madras, who has sent me his original notes made at 10 P.M., Indian Standard Time on June 8 (corresponding with 4.30 P.M., G.M.T.)”.

Evershed must had no knowledge about the observation of Nova as a ‘new star’ made by Chandra from a further eastern longitude at Bagchar even one night ahead of any other observer on the night of 6-7 June, 1918, at an earlier stage when its gradually increasing brightness was only 6 magnitude. On the night of 8-9 June 1918, Chandra made his second successive night observation while Mr. Bower of Madras (13° 4’ N, 80° 17’ E) and Miss Cook of Stowmarket, England both made their respective ‘first’ observation on the ‘new star’ at more brighter stage than the previous night. Yet, this remarkable achievement remained unrecognized due to his ignorance of the formalities involving astronomical discoveries.

APPENDIX III

In a letter dated 29 May, 1920, the Secretary of AAVSO Mr. How and O’Eaton appreciated Chandra by writing - “I want to thank you very much for the splendid list of observations of variable stars ...”

Harlow Shapely, Director of Harvard College Observatory, sent a letter (June 20, 1922) to Chandra with the words - “May I add a personal word of congratulation for the good work you have been doing in the observation of long period variable stars. Your longitude is of considerable importance in this work.”

Felix de Roy, Director, Variable Star Section, British Astronomical Association, expressed his desire to meet Mr. Chandra, in a letter dated 27 December 1923, by writing - “I seize this
opportunity in saying that your excellent observations and remarks are always much valued by
this section. ... I should be personally pleased to meet you if ever you were to cross to Europe.”

In a letter dated 29 March 1935, the Recording Secretary of AAVSO Leon Campbell con-
gratulated Mr. Chandra. The letter goes as - “I am pleased to receive such a splendid report of
observations as made during January and congratulate you on the excellence of observations”.
In the same letter, Mr. Campbell wrote - “I am pleased to acknowledge your postal card of the
16 January concerning the first estimates of Nova Herenlis. I am glad to note that you have kept
watch on this star and have secured such a continuous series of observations. The fluctuations
noted in the star certainly bear real and these have not ceased even up to the present time”.
So, this letter of Campbell reveals that Chandra estimated the variability of Nova Herenlis for
the first time.

In his article ‘The Role of the Amateurs in Variable Star Astronomy’, Leon Campbell has
remarked - “In foreign countries we have Radha G. Chandra, official of Bagchar, India. Mr.
Chandra, now in his sixtieth year, who has been aiding in the variable star work since 1919,
has accumulated probably more observations on variable stars than any other AAVSO foreign
observer, well over 50,000.”

APPENDIX IV

My dear Mr. Chandra,

For a longtime I have been very desirous of securing for you the use of a larger telescope
than you have. At last this seems about to be realized. Our patron and friend Mr. C. W. Elmer
of N. Y. has turned over to the Association his 6.25 inch lens in tube with finder and oculars
and cradle claps for attaching the tube to a mounting. The lens is a very good one and should
enable one to see much fainter objects than with a three inch instrument.

Now if you can see your way clear to provide some sort of mounting, either temporary or
permanent, the telescope committee is willing to let you have the loan of this splendid equipment
as described above.

... Just how to best arrange for such a loan is the serious question. As long as you live and
will keep the instrument in reasonable use for AAVSO. For variable star observing, the telescope
can be considered as virtually yours. The difficulty comes in the case of your death. What assure
can be had that the equipment would be resorted to the Association, either to some other observer
in Asia, Europe or U. S. A.? This is what bothers us. The equipment is valued at 500 dollars and as long as you keep it in good use, we shall feel well repaid for our efforts in lending to you.

I might suggest that your own three inch would make a very desirable additional finder, especially if you have no circles at first. The Association could defray the initial cost of transportation asking you to repay the Association as you could.

If you decide that the loan of this equipment is practical, that you can provide some sort of mounting for the present at least and will agree to use it exclusively for AAVSO observing, will take good care of it and reimburse the Association later for the transportation expenses and provide for its return to the Association or its authorized agent upon your demise or inability to make further use of it. Let me know and I shall start steps for having it sent to you at once.

With best wishes and kind regards, I am
Faithfully yours,
Leon Campbell
Chairman of Telescope Committee.

ACKNOWLEDGEMENT

We all thank Mr. Sisir Kumar Chandra, grandson of R. G. Chandra for helpful discussions. Thanks are also due to Prasenjit Basu, The Future Institute of Engineering and Management, Kolkata and Farook Rahaman, Jadavpur University, Kolkata for their technical help in different forms that improved the quality of the article a lot. SR is personally grateful to Prof. J. V. Narlikar for several suggestions and also to the authority of IUCAA, Pune for providing Visiting Associateship under which a part of this work was carried out.

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