

**Ancient Indian Astronomy and Contributions of Samanta Chandra Sekhar.** L. Satpathy (ed.). Narosa Publishing House, New Delhi. 2003.

Samanta Chandra Sekhar (1835–1904) was the last great naked-eye astronomer in the tradition of ancient Indian astronomy, who made original contributions to that tradition. He is also referred to as 'Pathani Samant'. He is hardly known outside Orissa, the region of India to which he belonged, where he is deservedly held in high regard.

I was not aware of Pathani Samant till my friend Trilochan Pradhan, about ten years ago, prepared a few pages of write-up about him for me. I was taken by surprise as my basic source for that period was the massive and authoritative compendium of Indian astronomy *Bharatiya Jyotish* written in Marathi in AD 1896 by Shankar Balakrishna Dixit, where the work of practically all the earlier as well as contemporary Indian astronomers was noted. He mentioned and discussed the work of Venkatesh Bapuji Ketkar, Vinayaka Pandurang Khanapurkar, Sudhakar Dvivedi and even Bala Gangadhar Tilak. About Dvivedi he comments, 'He has the ability to produce an astronomical treatise in Sanskrit based on the same French original sources which are used to produce English Nautical Almanac. It would be nice if he does so'. The comment also shows that the traditional astronomers in India were getting to know of the Western astronomy. But there was no mention of Pathani Samant. How did Dixit miss his work? Samanta Chandra Sekhar began writing his magnum opus *Siddhant Shiromani* when he was twenty-six (AD 1861), and it was completed in AD 1869, when he was thirty-four. However, the work remained in manuscript form, written on palm leaves and in Oriya script, for about thirty years and thus unknown outside Orissa. In 1899, Jogesh Chandra Ray of Cuttack edited the work and published it from Calcutta in Devanagiri script. By that time, Dixit's compendium was already in print for three years. One wishes that it had not taken thirty long years to publish the work. A mention in Dixit's work would have brought much wider notice for the work of Pathani Samant, as Dixit was, as is still, well known for his work *Indian Calendars* in English with G. Sewell, *Bharatiya Jyotish* and other publications in Marathi.

Pathani Samanta is not even mentioned in INSA publication *A Concise History of Science in India* edited by D. M. Bose *et al.* The purpose of the present volume is to remedy this unfortunate situation and bring the work of Pathani Samant to the attention of wider scientific community in India and to place that work in the framework of ancient Indian astronomy.

Before proceeding further, let me mention that this volume also reprints some of the basic source material about Pathani Samant. These include (i) Jogesh Chandra Ray's scholarly introduction of fifty-six pages to his edition of *Siddhanta Darpan*, (ii) two reviews of that edition, one which appeared in *Nature* (1899) entitled 'A Modern Tycho' and the other on 'Knowledge' (1899). Calling Samant a modern Tycho, a high praise indeed, was in reference to his planetary model which was similar to that of Tycho Brahe. These two reviews more or less exhaust all the scientific attention Pathani Samant received in the West. Also reprinted are two recent articles on him by P. C. Naik and the editor of this volume, Satpathy.

In the first chapter 'Samanta Chandra Sekhar and his contribution to ancient Indian astronomy', Satpathy sets out the theme of the volume. In view of the originality of Pathani Samant in introducing a new planetary model, in which all the planets except the earth go around the sun, while the sun and moon revolve around the earth, Naik (chapter 6) discusses the planetary model of *Siddhanta Darpan*. T. Pradhan (chapter 4) discusses the determination of distances to the sun, moon and stars as estimated by Pathani Samant, which was revolutionary in the Indian context. S. Balachandran Rao together with Padmaja Venugopal and S. K. Uma (chapter 7) discuss various corrections for planetary positions in *Siddhanta Darpan*, and complement the discussion by Naik. K. Ramasubramanian, who along with M. D. Srinivas and M. S. Sriram, has brought to attention the work of the Kerala school of astronomy during the thirteenth to eighteenth centuries, comments (chapter 3) on the work of Samanta in the light of that tradition. There are also other appreciations of Samanta and his work by S. Pattanayak (chapter 2), A. Badhyapadhyay (chapter 8) and R. Chakrabarti (chapter 9).

Pathani Samant was motivated to write *Siddhanta Darpan* after he realized that his observation of the planetary positions did not tally with what could be calcu-

lated using the methods and parameters of planetary motions as given by ancient *siddhantas*. As mentioned earlier, his observations were all done with the naked eye and assisted by various instruments which were designed by him. When in his old age he was shown a telescope, he is supposed to have cried with regret that it had come too late for him to use. We have mentioned that he introduced the planetary model and made considerably better estimates of the distances of the sun and moon. He also discussed a number of corrections, to be added to the mean motion of the moon and the planets, so that agreement between the observations and calculated planetary positions would be significantly improved. Samant's work was accepted at a conference of Sanskrit Pandits, as the basis of calculation of timings for various rites at the Puri Jagannath temple in 1876, as it was seen to accord better with observations, and has been used since then.

In order to provide proper background for the achievement of Samant, the volume also has papers discussing ancient Indian astronomy. Indian tradition is placed in its world context by M. K. Pal in his valuable review (chapter 11) 'History of ancient civilization and development of astronomy'. In the present context, where ancient Indian history has become subject to various agendas, it is nice to see that Pal adheres to the better scholarship in the matter. T. N. Dharmadhikary gives 'Some glimpses from the Vedic astronomy' (chapter 13) and provides references to astronomical topics therein. Chronology used by A. K. Upadhyay in his article 'Astronomy of Vedic times' leaves much to be desired. However, in view of his service in publishing a Hindi translation of *Siddhanta Darpan*, of which one volume has come out, I forbear to say anything further. The work of Pathani Samant falls in the tradition of *Siddhant* works of Indian tradition. These are described by S. K. Gupta (chapter 15). I may refer here to D. Pingree's survey 'History of mathematical astronomy in India' in *Dictionary of Scientific Biography* (1978, vol. 15) for a survey of Western research. It is sad to mention that despite Saha's calendar reform committee (1955), Bengali calendars are still in a mess, as discussed by P. B. Pal (chapter 14), due to irrational adherence to Surya Siddhant. Even in Indian tradition, Surya Siddhant was improved later.

## BOOK REVIEW

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Modern astronomy using optical telescope began with Galileo. P. Ghose pays tribute to him in 'The Starry messenger' (chapter 15). There are a few papers by J. C. Pati, on grand unification (chapter 16), D. P. Roy on the constituents of visible and invisible matter (chapter 17) and R. N. Mohapatra on dark matter (chapter 18), which bring home the point that the torch lit by Pathani Samant is still burning bright. The article by Roy is

of great pedagogic interest. A. K. Prasanna (chapter 19) discusses 'Inertial forces: a la Newton in general relativity'. The last paper by G. Rajasekaran is short and moving, 'In praise of astronomy' (chapter 20).

Satpathy has rendered a signal service to the cause of bringing the work of that original genius Samanta Chandra Sekhar to the notice of Indian and world scientific community. It is quite informative

and excellently edited. It would be desirable to bring out an annotated English translation of *Siddhanta Darpan*.

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