Ṭhakkura Pherū, *Gaṇitasārakaumudī: The Moonlight of the Essence of Mathematics*, ed. with introduction, translation and mathematical commentary, by 'SaKHYa' (New Delhi: Manohar), 2009, large size, pp. 278, Price, ₹ 995.

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One should first clarify that the mystifying name 'SaKHYa' on the title-page represents a four-member team comprising Professor Sreeramula Rajeswara Sarma from India, and Professors Takanori Kusuba, Takao Hayashi and Michio Yano from Japan. All the four are distinguished scholars who have published notable researches on the history of Indian mathematics and astronomy, as well as in other fields. It is fitting that they should have come together to interpret for us a remarkable text from a remarkable man, Ṭhakkura Pherū, a devout Jain, jeweller, merchant, mint-official under the Khalji government (1290–1320), and a polymath, who wrote in Apabhraṁśa.

The volume begins with an introduction in which all that is known of Ṭhakkura Pherū is presented to us, the facts drawn necessarily mainly from his own works. We have here also brief descriptions of the six other scientific texts that he wrote. From the point of view of the economic historian, the two most interesting of these are the *Ratnaparīkṣhā* (*Rayaṇaparikkhā*) on gemnology, written in 1315, and already translated with full annotation by Professor S.R. Sarma (Aligarh, 1984), and the *Dravyaparīkṣhā*, on coins, written in 1318, with only a partial English translation published by V.S. Agrawala in *Ghulam Yazdani Commemoration Volume* (Hyderabad, 1966, pp. 81–101).

The *Gaṇita-sāra-kaumudī*, or *Gaṇitasāra* for short, the seventh scientific text, receives in the volume under review the fullest possible scholarly treatment. A very comprehensive and informative Introduction is followed by a carefully annotated text set out in roman transcription. Then we have an English translation, as literally accurate as possible (which in some portions unfortunately still remains unintelligible for no fault of the translators). The Mathematical Commentary extending to nearly 100 pages (pp. 97–193) must be of exceptional interest to students of the history of Mathematics. In fact, it is a commentary on the entire text and, fortunately for persons like the reviewer, who never moved beyond the Arithmetic of Chakravarti (a major school text in the 1940s), the Commentary does not ignore the non-mathematical material in the text. From the linguistic point of view the Glossary Index to the Text (pp. 224–56) is of very great value, since here the Sanskrit-derived words and words of other etymological origin are clearly distinguished.

The *Gaṇitasāra-kaumudī* is essentially a textbook which in versified form transmits the inherited knowledge of mathematics and modes of calculation, drawing upon two works of Srŏdhara (*c.* 750), as the editors have well shown. Even in such acts of copying, the editors find points of interest. Pherū reproducing a rule form Śrīdhara for calculating prices of living things, changes the price of 'two women aged twenty years' into price of 'five camels nine years old' (p. xxv). Is a change of social outlook to be deduced here?

The editors are right in pointing out that Pherū's mathematical text acquires additional value when he includes supplementary material with an eye to current practical use. Thus his calculations regarding buildings, like domes, spiral minarets, arches and arch-based bridges (pp. 69–70), show how much by Khalji times Indian masons had become familiar with architectural techniques imported from the Islamic world.

In the rather miscellaneous material in the latter portion of the text we find greater examples of such practical formulae. One is given for the conversion of Vikrama era dates into Hijri dates and vice versa (p. 77). This had naturally become important when the Hijri era was in use in administration. Unfortunately the formulae Pherø provides for calculating problems of cloth use, tents, etc., remain obscure, as the translators frankly acknowledge (pp. 77–79). But at least on one matter this reviewer can make a comment. Of the four kinds of silk cloth named here (verse 4.18), *paṭṭolaya* and *atalasa* are, of course, *patola* and *aṭlas* of the Persian sources, as the translators recognise by citing *Hobson-Jobson*. But the other two are also identifiable. *Juja* is *juz* of the Persian texts. Pherū's reference to it makes clear that *juz* is the correct form not *khaz*, a spelling also found in Persian texts through a different positioning of dots. The *sāra* of Pherū is *sha'r* mentioned by Amīr Khusrau as a high-price cloth, and also by 'Iṣāmī (1350), who puts it, along with *juz*, among 'heavenly' fabrics.

Pherū's Chapter 5 has interesting data on crop-yields (p. 85) which largely match those given by 'Abdu'l Ḥamīd Muḥarrir Ghaznavī's *'Ilmu'l Hiṣāb* of Fīroz Shāh's

time (p. 187). It appears that certain standard crop-rates were in use in land-tax assessment and thus arose the need to put them into verse for better memorisation, whether in local dialect or in Persian. In Pherū's text these data are followed by rates of cattle tax and mode of calculation of area of surveyed fields, so that the information would have been of benefit to those looking for low-ranking revenue employment.

Professor S.R. Sarma and his Japanese colleagues deserve sincere congratulations for making available such a well annotated translation of Pherū's *Gaṇitasāra*. The translators are unique in possessing the necessary mathematical and linguistic competence, which they have put fully to use to elucidate numerous riddles of the text. If some obscurities still remain, these may in time be resolved, now that so much has already been clarified and explained for us in this translation, which meets so well all the possible demands of historical scholarship.

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