

Gaṇitasāraṅgamaudī: The Moonlight of the Essence of Mathematics, by Ṭhakkura Pherū. Edited with Introduction, Translation, and Mathematical Commentary by SAKHYA (SREERAMULA RAJESWARA SARMA, TAKANORI KUSUBA, TAKAO HAYASHI, and MICHIO YANO). NEW DELHI: MANOHAR, 2009. Pp. xlvi + 278. Rs. 995.

One of the first significant Indian texts on *pāṭīgaṇita* (arithmetic) to follow the magisterial *Lilāvati* composed by Bhāskara II in the mid-twelfth century, the *Gaṇitasāraṅgamaudī* (ca. 1300) is unique or groundbreaking in many ways. It is the first treatise in this genre composed in Middle Indic (that is, in one of the Indo-Aryan vernaculars collectively known as Prakrits, more specifically late Middle Indic Apabhraṃśa). Its author, Ṭhakkura Pherū, was one of the first Jain merchant-officials to synthesize the traditional Indic versified textbook with technical knowledge relevant to the functioning of the newly established Indo-Muslim regimes. In this work Pherū combines standard topics from the Sanskrit “pre-algebra” mathematical canon (algorithms for basic arithmetic and its applications to commercial problems, rules in plane and solid geometry, etc.) with innovative features including the geometry of typical Muslim architectural elements such as the dome and true arch, Indic/Muslim calendar conversion rules, and various mathematical puzzles.

This admirably competent and comprehensive re-edition of the 1961 *editio princeps* by A. and B. Nāhaṭā, with accompanying bio-bibliographic introduction, translation, commentary, various technical appendices and indexes, and a detailed bibliography, was produced by a group of four scholars who began analyzing Sanskrit and hybrid-Sanskrit mathematical texts as students and colleagues of the late David Pingree at Brown University (to whose memory the book is dedicated). Together, the collaborators (whose *nom de plume* means “friendship” in Sanskrit) have amassed over a century of experience in working with such texts, and their expertise is evident in the breadth, depth, and precision of the published result.

As in many similar publications by the same authors, the structure of the book is rather complicated but systematically organized, making good use of L^AT_EX typesetting to represent both modern mathematical notation and graphical characteristics of the Prakrit text. Following a list of abbreviations and a preface by the first editor, part I in two sections discusses available information on Ṭhakkura Pherū and surveys the content of his arithmetic. Part II, in chap-

ters 0–6, contains an introduction explaining editorial conventions and manuscript details, the edited text of the five divisions or chapters of the *Gaṇitasāraṅgamaudī* in roman transliteration, and a supplementary partial list of its contents apparently compiled by a later author. The same five divisions and contents list are translated in part III’s chapters 1–6. Each of the five chapters of part IV provides mathematical commentary on one of the five text divisions. Four appendices, A through D, supply a concordance of topics treated in this work and in similar Sanskrit mathematics treatises, an explanation of particular “types” or categories of algorithms used, an index of numerical values appearing in the text which are referenced by chapter and verse number, and an extremely useful glossary-index of Pherū’s technical terms (in Prakrit alphabetical order) similarly referenced, with their translations and cognates in Sanskrit or other related languages.

The bibliography lists primary and secondary sources separately. It is followed by an index of (English) mathematical technical terms that will prove especially valuable to non-Indologist historians of mathematics seeking information on Indian primary source texts, an index of non-mathematical objects and concepts mentioned in the *Gaṇitasāraṅgamaudī*’s sample problems, and an index of names of Indic authors and work titles with their abbreviations. All these index entries, conveniently for readers trying to look up a particular concept or citation rather than to read the text in detail, are referenced by page rather than verse number.

The *Gaṇitasāraṅgamaudī* is not only the first major Middle Indic *pāṭīgaṇita* treatise extant but also the first to be critically examined in modern history-of-mathematics scholarship. Much of its Apabhraṃśa technical vocabulary remains obscure, and even Sakhya’s proficiency in this textual genre has been insufficient to decipher the meaning of a few of the verses, which have been left untranslated. For the most part, though, this volume provides a thorough exposition as well as a conscientious rendering of this important work, augmented by knowledgeable descriptions of its historical and intellectual context. The editors have opened up new territory in the serious study of Indian mathematics, in addition to substantially enriching our knowledge of more familiar aspects of the genre.

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