

BOOK REVIEWS

David Pingree. *Census of the Exact Sciences in Sanskrit*, Series A, Volume 3. American Philosophical Society, Independence Square, Philadelphia, 1976. pp. 208. Price 15 dollars.

Census of the Exact Sciences in Sanskrit aims at providing all available bibliographical information concerning works in *Jyotiḥśāstra* and related fields, written in India from the earliest known times to the present day, and biographical information concerning their authors. *Jyotiḥśāstra* is traditionally divided into three branches: (1) *gaṇita* or mathematics and mathematical astronomy, (2) *horā* or genethliology and other fields of horoscopic astrology, and (3) *Samhitā* or divination. The related fields included in the *Census* are cosmology and geography (largely of the Jainas) and those aspects of *dharmasāstra* that involve the determination of the proper times for the performance of ritual acts. Of the three branches of *Jyotiḥśāstra*, only *gaṇita* deserves to be called an exact science; the other two have been called exact by the author of the *Census* probably by association.

The *Census* is being brought out in two series—Series A and B. Series A, of which the first three volumes have appeared in print, contains articles on the authors arranged in the order of Sanskrit alphabet, and Series B, which is to appear after the completion of Series A, will contain articles on the books, mainly in Sanskrit, arranged in the same manner. Volumes 1 and 2, which appeared in 1970 and 1971 respectively, contain information concerning authors whose names begin with *a, ā, i, ī, u, ū, e, ai, o, au, k, kh, g* and *gh*. Lists of periodicals and series, books and catalogues, consulted by the author in the compilation of the *Census*, are also given. Volume 3 of Series A, under review, contains information concerning authors whose names begin with *c, ch, j, jh, ṣ, ṭh, ḍ, ḍh, t, th, d, dh* and *n*, and additional information, if any, concerning authors already discussed in Volumes 1 and 2. Additional lists of periodicals and series, books and catalogues, consulted subsequently by the author, are also given.

The article under each author first gives all available information on his date, ancestry, locale, religious affiliation, and social position; then it lists his works relevant to *Jyotiḥśāstra*, and under each work lists its commentators, its manuscripts and editions, and any discussions of it; and finally there is given a table of its contents and those passages in it that throw light on the author or his works.

Volume 3 of Series A has a greater coverage than the earlier two volumes. It contains supplementary information concerning about 100 authors already discussed in Volumes 1 and 2, and information concerning about 800 new authors. The total number of authors discussed in Volumes 1, 2 and 3 is about 1450.

Although attempts were made to collect information regarding Indian astronomers and astrologers by Sudhākara Dvivedī (1892) in his *Gaṇaka-taraṅgiṇī* and by Saṅkara Bâlakṛṣṇa Dikṣita (1896) in his *Bhâratiya Jyotiṣaśâstra* and to gather references to manuscripts dealing with mathematics and astronomy by S. N. Sen (1966) in his "*Bibliography of Sanskrit works on Astronomy and Mathematics*," but none of these approaches the coverage of the *Census* which is by far the most comprehensive and up-to-date work of the kind and surpasses the earlier works in usefulness.

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K. V. Sarma, *Candracchâyâgaṇitam* of Nilakaṅṭha Somayâji. Punjab University Indological Series, No. 6. V. V. B. I. S. and I. S., Panjab University, Hoshiarpur, 1976. xxvi+31. Price Rs. 10.00.

The *Candracchâyâgaṇita* has been edited along with the author's commentary on it for the first time on the basis of three manuscripts of the text and one manuscript of the commentary.

This work, consisting of 32 stanzas, deals with astronomy and sets out methods for finding the length of the gnomonic shadow due to moonlight for the given time during the night and *vice versa*. These methods are better than those given in the earlier works.

In the introduction the editor describes the manuscripts used by him and the details of the author's life and works. In the end of the book there are two appendices, one giving a formula for finding the hour angle of the Moon and the other comments on a stanza of the work.

Nilakaṅṭha Somayâji, the author of the *Candracchâyâgaṇita*, hails from the village Trikkañṭiyûr, near Tirur, S. Ry., Ponnani tâluk, South Malabar, and is a well known astronomer of the 15th and 16th centuries A. D.

K. V. Sarma, *Siddhânta-darpaṇam* of Nilakaṅṭha Somayâji. (New edition) Panjab University Indological Series, No. 7. V. V. B. I. S. and I. S., Panjab University, Hoshiarpur, 1976. xxviii+54. Price Rs. 12.00.

This new edition of the *Siddhânta-darpaṇa* by the same author is furnished with the author's commentary also and is based on seven manuscripts of

the text and one of the commentary. The text, consisting of 32 stanzas, gives astronomical parameters and a few selected rules for certain astronomical determinations. The astronomical parameters stated in this work are generally different from those given by the author in his *Tantra-saṅgraha* (or *Golasāra*). The reason for this deviation is not stated. The work ends with two appendices setting out astronomical parameters of the work in the alphabetic notation which was more popular in Kerala than the word-numeral notation used in the *Siddhānta-darpaṇa*.

K. V. Sarma, *Rāsigolasphuṭānīṭi* of Acyuta Piṣāraṭi. (New edition). Panjab University Indological Series, No. 8. V. V. B. I. S. and I. S., Panjab University, Hoshiarpur, 1977. pp. 41. Price Rs. 9.00.

Acyuta Piṣāraṭi (ca. 1550 to 1621 A. D.), like Nilakaṇṭha Somayāji, hails from the village Trikaṇṭhiyūr in South Malabar. He was a pupil of Jyeṣṭhadeva, the celebrated author of the *Yuktibhāṣā*, and the author of about half a dozen works on astronomy.

In the work under review Acyuta states two views regarding the conjunction of the Sun and Moon. According to one the conjunction of the Sun and Moon occurs when the Sun and Moon are on the same secondary to the ecliptic, and according to the other it occurs when the Moon in its orbit is at the same distance from its node as the Sun is in the ecliptic. Acyuta favours the former view and refutes the latter. For those who hold the latter view and measure the longitudes of the planets in their own orbits, he prescribes a further correction called "*rāsigolasphuṭānīṭi*" ("reduction to the ecliptic") and quotes a formula for it from his earlier work, *Sphuṭanirṇaya*, and also refers to a simplified formula (in the case of the Moon) stated in his *Uparāga-kriyākrama*. It must be noted that Acyuta was the first Hindu astronomer to have stated this correction. In the west the earliest astronomer to state this correction was Tycho Brahe (1546-1601 A. D.) who lived about the same time as Acyuta.

Dr. Sarma's new edition of the *Rāsigolasphuṭānīṭi* consists of 54 stanzas and is based on two manuscripts which have been described in the introduction to the work.

All the three works reviewed above are furnished with English translation and English-knowing readers who do not know Sanskrit will have no difficulty in understanding them. There is no doubt that they will prove interesting and useful to all concerned with the study of astronomy and its history.

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Wolfgang Stegmüller. *The Structure and Dynamics of Theories*. Tr. from German by William Wothueter New York. Heidelberg-Berlin : Springer Verlag, 1976, pp. xvii+284.

As science advances, the fundamental philosophical issues concerning the nature of its conceptual framework become sharper and sharper. These issues may not be directly relevant to the activity of the scientist as a researcher. But their importance is seen as obvious when one steps out of the scientific operation as such and questions the meaning and the very truth-discovering ability of science. What is a scientific theory and how does it emerge? Is there a conclusive way of demarcating science from non-science or myth? To what extent is scientific observation theory-laden? How do scientific theories change—how does one theory give place to another? And is rationalism, on which the whole edifice of science is founded, the infallible method for apprehending the universe? These and similar questions have appeared and given rise to most controversial positions among writers in the philosophy of science.

Very significant breakthroughs in our conceptions of science, scientific theory, scientific language, scientific revolution, paradigm, the testing of hypothesis, etc., have been caused by Carnap, Popper, Kuhn, Feyerabend, Ramsey, Braithwaite, and Lakatos. Professor Stegmüller takes a review of these breakthroughs by singling out for a detailed study the structure of scientific theory and the theory dynamics. His is a new approach both to the analysis and to the understanding of the concept of theory. He rules out, for instance, the widely prevalent view that T. S. Kuhn's position on the "scientific revolutions" contains irrationalism and relativism. For Professor Stegmüller the very thesis of Kuhn that "a theory is never rejected on the basis of falsifying data but always dislodged by another theory" is a statement of his rationalism.

There are two classes of thinkers on the scene of the philosophy of science today: those whose approach is strictly logic-oriented and the others (like Kuhn, Lakatos, and Feyerabend) who tend to reject critical rationalism and logical empiricism and show the role of non-rational factors in the history and growth of science. Among these latter, Feyerabend is the most outspoken repudiator of the "logic of science".

Professor Stegmüller's book is an attempt to reconcile the contention of the logic-oriented proponents the philosophy of science with that of the "rebellious". Therefore, while reconstructing the theory conceptions of the

writers of the two camps he practises a kind of liberalism so that he is able to see the inadequacy of the arguments of one camp in absence in it of certain arguments of the other camp. As he does in his examination of Kuhn, Professor Stegmüller resets and reinterprets the assumptions of the writers he studies.

The book is a highly learned treatise in the redefinition of "rationalism" and "irrationalism" in contemporary philosophy of science and their possible synthesis.

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