Dold, Yvonne; Dauben, Joseph; Folkerts, Menso; van Dalen, Benno (Eds.): *From China to Paris: Two Thousand Years Transmission of Mathematical Ideas*, Stuttgart: Steiner, 2002 (Boethius, Vol. 46). IX + 470 pp.

This book is the written version of papers read at a conference at the Rockefeller Foundation's Research and Conference Center in Bellagio in May 2000. The first item (pp. 1-7), however, is an English translation of Kurt Vogel's "Ein Vermessungsproblem reist von China nach Paris" (1983). This explains the title of the volume and establishes its leitmotif: the transmission of mathematical ideas, particularly the sometimes mysterious transmission of recreational mathematics. All the contributions, except two in French, are in English.

Vogel studied the problem of finding the height and distance of an island by aligning two poles with its high point. First in ancient and medieval China, then in medieval India - here as the mathematically equivalent problem of finding the height of a lamp with the two poles. From India the problem travelled to the Arabic-Islamic world, to al-Biruni's *Book of Shadows*. From there it travelled to the Latin world - to the *Geometria incerti auctoris*, which also used the shadow quadrant on the back of an astrolabe - and to Hugh of St. Victor.

J. Høyrup (pp. 9-29) describes some Babylonian collections of mathematical problems - e.g. about the sides and diagonal of a rectangle or about the height of a pole leaning against a wall and the distance of its lower end from the wall. Their origin is ascribed to a "sub-scientific", mainly oral "'surveyers' tradition". Some of the Seleucid problems, e.g. on leaning poles, are remarkably similar to problems in two Demotic sources (perhaps 2c. AD), which also contain material on the summation of series. It seems that the Egyptian mathematicians were copying the common problems from the Babylonians. In Latin, the *Liber mensurationum*, translated by Gerard of Cremona from the Arabic of one Abu Bakr, and Leonardo of Pisa's *Practica geometrie* have almost all the Seleucid problems. Further similarities are found in Greek, Indian and Chinese sources.

J. L. Berggren (pp. 31-44) presents seven methods for determining approximate square roots. Finding many of these methods in various cultures, he makes suggestions for routes of transmission (e.g. with origin in Babylonia), but warns that independent invention is always possible. Also, deductions made from individual approximations are often difficult, since one approximation is often obtainable from several procedures. An entertaining coda on the value of π is added.

Sesiano (pp. 45-56) collects evidence for the form of ancient Greek multiplication tables from an Arabic description of Coptic practice, Coptic fragments and tables in Armenian and Byzantine sources. Since little remains of the ancient Greek tables, the massive documentation given in this article is very welcome.

A. Bréard (pp. 57-86) describes several problems of meeting and pursuit, in which two men or animals move on the same path at various speeds in the same or opposite direction. These are to be found in ancient and medieval collections. Some of these problems are explicitly astronomical and some may be interpreted astronomically (as referring to the conjunction of planets). Similar problems turn up in Indian astronomy and even in medieval Latin texts, such as Alcuin's *Propositiones ad acuendos iuvenes*. China may be assumed as the origin of these problems, but details of transmission to other parts of the world remain unclear.

K. Chemla and A. Keller (pp. 87-132) point to interesting similarities, in China and India, in the understanding and manipulation of irrationals, but come to no definite conclusion about the question of transmission. Since al-Khwārizmī's operations are very similar, they suggest an Indian influence on Arabic algebra.

S. Sarma (pp. 133-156) outlines the history of the Rule of Three and its developments within India. Some of his examples are from recreational mathematics. He briefly discusses the transmission of the rule to the Islamic world and Europe.

In his treatment of Double False Position, Liu Dun (pp. 157-166) quotes an example from the *Nine Chapters on the Mathematical Art* (China, 1c. AD). This problem is similar to that of Hiero's crown in the famous story about Archimedes. The method, somewhat transformed, was transmitted to Europe and returned, together with the Archimedes story, in the sixteenth century.

K. Plofker (pp. 167-186) shows the iterative approximations, though known in Greek writings, seem to make an independent appearance in Indian astronomical and mathematical works; some of these methods found their way into Islamic science - e.g. in the works of Ḥabash and al-Bīrūnī. Iterative methods were further developed in Indian mathematics, with its emphasis on computation rather than proof.

J. Hogendijk (pp. 187-202) describes the treatment of anthyphairetic ratios (in which the definitions of equal and greater ratios depends upon procedures equivalent in modern terms to those of continued fractions) in al-Mahānī (9c.), al-Nayrīzī (9c.) and al-Khayyāmī (d. 1131). He tentatively suggests a lost Greek original, thus opening a new window on Greek theories of ratio.

U. Rebstock (pp. 203-212) presents a description of the arithmetical text, found thirty years ago in a library in Medina, by Abu 'l-Ḥasan ʿAlī al-Uthmānī (fl. mid-11c., Syria). It is a summary of a longer, but lost, work by the same author. Rebstock shows that the text is an early forerunner of thirteenth-century *ḥisāb* texts.

A. Djebbar (pp. 213-235) treats the various aspects of transmission within Islam, including matters of terminology. Some Eastern Arabic works and ideas were not known in the West. Finally, the circulation of some Andalusian and Maghrebi mathematical writings in the East are discussed.

C. Burnett (pp. 237-288) presents a richly illustrated account of the two basic forms of the Hindu-Arabic numerals, the eastern and the western. The eastern forms were used by Latin scholars, particularly the early translators; they were probably displaced by the forms used by the Toledan translators. The treatment is enriched by a wealth of information and suggestions about the association, or even collaboration, of scholars, deduced, for instance, from the places where they worked and the coexistence of their works in early codices.

R. Franci (pp. 289-306) traces the problem of the Jealous Husbands Crossing the River from Alcuin (9c.) to Tartaglia (ca. 1505-1557), mostly in Latin and Italian sources. In this problem three men with their wives (or sisters) must cross a river in a boat only big enough for two, on the condition that a woman is never in the presence of a man without her husband's (or brother's) being present. Although the problem is seldom mentioned in the *Trattati d'abaco* tradition, which often had a place for problems in recreational mathematics, Franci points to numerous treatments, some with deviant interpretations of the "jealousy" condition, and some with extension to more couples than three.

T. Levy (pp. 307-326) presents a concise and informative survey (with a generous bibliography) of medieval mathematics in Hebrew in Spain, Provence, Italy and Byzantium. Special reference is made to the translations from Arabic, but something of the complexity of this rich tradition is also described.

In B. van Dalen's "Islamic and Chinese Astronomy under the Mongols" (pp. 327-356) we find a good summary of present knowledge of the exchange of astronomical ideas between Chinese and Islamic scholars, inter alia in calendrical matters. Islamic *zījes* were admired by the Chinese astronomers for their accuracy; and several were translated into Chinese. Chinese influence on Islamic science may be seen, for instance, in the establishment of the Persian solar-lunar calendar. At the end of the article is a section on methods of investigating relationships between tables, one of van Dalen's specialisms.

M. Bagheri's paper (pp. 357-368) is on the depression of the horizon, or the question of how much more of the heaven does one see because of one's height. He appends an Arabic text, which he gives reasons for ascribing to Jamshīd al-Kāshī, with English translation.

A. Volkov (pp. 369-410) describes the Vietnamese arithmetical work *Toan phap dai thanh*, a treatise in the Chinese style attributed to Luong The Vinh (15c.). Some of the problems it contains are on such standard mathematical procedures as root extraction or the determination of the areas of figures, but there are also sections on land taxation and numerical divination. Chinese sources are indicated, but it is hard to specify them.

M. Folkerts (pp. 411-428) discusses mathematical problems in three collections in Regiomontanus' hand (including the unedited collection in MS Plimpton 188). Some of the problems might be described as recreational mathematics; others are algebraic or geometrical. Most have an Italian origin. Many reappeared in later German treatises. Thus Regiomontanus, who spent some years in Italy, may be seen as an important figure in the transmission of mathematical ideas from Italy to central Europe.

The last paper (pp. 429-453) is an account by D. Pingree of the Sanskrit renderings of de la Hire's *Tabulae astronomicae* in the eighteenth century. The first, in verse, was the most popular, but contained only rules. Only the third version attempted to give the geometrical basis. The paper describes how the tables were brought into Indian culture.

Richard Lorch

S.M. Razaullah Ansari (ed.), *History of Oriental Astronomy. Proceedings of the Joint Discussion-17 at the 23rd General Assembly of the International Astronomical Union, organised by the Commission 41 (History of Astronomy), held in Kyoto, August 25-26, 1997.* Astrophysics and Space Science Library, vol. 274. Kluwer Academic Publishers. Dordrecht/ Boston/ London, 2002, XIII+ 282 pp.

This volume compiles the Proceedings of a Symposium on Oriental Astronomy (mainly Chinese, Japanese and Korean, but also Islamic and Indian) during Medieval and Modern times. The collection contains 19 papers accompanied by an introduction