

## Reviews

*The Star of Bethlehem: an Astronomer's View*, by Mark Kidger, (Princeton University Press, Princeton, New Jersey, 1999), xi + 306 pp., ISBN 0 691 05823 7, £14.50, US\$22.95, cloth, 222 × 147 mm.

*The Star of Bethlehem: the Legacy of the Magi*, by Michael R Molnar, (Rutgers University Press, New Brunswick, New Jersey, 1999), xvi + 187 pp., ISBN 0 8135 2701 5, £23.50, US\$25.00, cloth, 222 × 147 mm.

Now when Jesus was born in Bethlehem of Judaea in the days of Herod the king, behold, wise men from the east came to Jerusalem.

Saying, Where is he that is born King of the Jews? for we saw his star in the east, and are come to worship him.

And when Herod the king heard it, he was troubled, and all Jerusalem with him.

And gathering together all the chief priests and scribes of the people, he inquired of them where the Christ should be born.

And they said unto him, In Bethlehem of Judaea: for thus it is written by the prophet, *And thou Bethlehem, land of Judah, Art in no wise least among the princes of Judah: For out of thee shall come forth a governor, Which shall be shepherd of my people Israel.*

Then Herod privily called the wise men, and learned of them carefully what time the star appeared.

And he sent them to Bethlehem, and said, Go and search out carefully concerning the young child; and when ye have found *him*, bring me word, that I also may come and worship him.

And they, having heard the king, went their way; and lo, the star, which they saw in the east, went before them, till it came and stood over where the young child was.

Matthew II:1-9

The above few verses from Matthew's gospel are the only mention of the Star of Bethlehem in the New Testament. Similarly, all the other references to it in ancient sources are thought to derive from Matthew rather than being independent accounts (but see below). Of the four gospels of the New Testament only Matthew and Luke mention the birth of Christ. Those of Mark and John begin with Christ's adult ministry, following the usual classical tradition which attached little importance to childhood. Further, Luke and Matthew give different accounts of Christ's birth: briefly, Luke has the shepherds and angels, Matthew the Magi and the star. The familiar plot of countless nativity plays is a conflation of these two accounts. The Greek word originally used in Matthew's account is Anglicized as 'Magi'. The singular was 'magos', which is usually taken to mean a learned astrologer and diviner, probably also with a priestly rôle, who acted as adviser to princes and rulers. 'Wise men' is as good a rendering into English as any. The Magi are usually assumed to have travelled from Babylonia or Persia. The tradition that they were themselves kings is an interpolation by the early Church, which disapproved of astrology. Nowhere in Matthew is the number of the Magi mentioned; the idea that there were three is also a later invention and estimates of the numbers have ranged from two to fourteen at various times.

None of the gospels are eyewitness accounts of the events they describe. The author of Matthew's gospel is usually thought to be a Christianized Jew living in Antioch around AD 85. At least three possible types of explanation have been proposed for his story of the star: that it was a fabrication, a supernatural event, or a report of an astronomical phenomenon. Biblical scholars usually, though not universally, prefer the first alternative and consider the account a 'Midrash', a story concocted for allegorical and instructional purposes, and usually involving a prophecy being fulfilled (Paffenroth, 1993; Stevens, 2000). Such stories are a common feature of Jewish religious writing. In the present case the prophecy of Balaam (Numbers XXIV:17) is probably the passage being alluded to:

There shall come forth a star out of Jacob,  
And a sceptre shall rise out of Israel:

Despite this inauspicious background there have been numerous attempts to find an astronomical phenomenon which could have been the basis of the star in Matthew's account. Indeed, the appearance of articles on this topic in newspapers and popular astronomy magazines during December is almost an annual event. This enterprise is usually considered to have begun with Kepler and his observation of a 'new star' in 1604, though he regarded the Magi's star as a supernatural event with no conventional astronomical explanation. In 1979 Freitag was able to list over three hundred books and articles about the Star of Bethlehem and their production has continued unabated since. This corpus represents a remarkable ratio of exegesis over the scant source material. Two new books on the topic have appeared relatively recently: *The Star of Bethlehem: an Astronomer's View* by Mark Kidger and *The Star of Bethlehem: the Legacy of the Magi* by Michael R Molnar. Both are aimed at the general public rather than a more specialized audience.

Mark Kidger is an astronomer working at the Instituto de Astrofísica de Canarias, Tenerife. He also writes and broadcasts on popular astronomy in both English and Spanish. His book is a review and synthesis of the various explanations that have been proposed for the Star of Bethlehem. It is very much in the same tradition as Hughes' *The Star of Bethlehem Mystery* (1979), but with the benefit of an additional twenty years of scholarship. It covers the history and background to the Star of Bethlehem story and describes the usual suspects: planets, planetary conjunctions, comets, meteors, novae, and supernovae. For each type of candidate a brief description of modern astronomical understanding of the phenomenon is given, together with a discussion of how well it fits the Star of Bethlehem story. Kidger concludes with a tentative suggestion that the Star of Bethlehem was a previous eruption of the nova DO Aquilae in 5 BC, following a series of planetary conjunctions over the preceding couple of years.

Kidger seems surer of the astronomy than the historical background to the story (in mitigation it should be recalled that his book is subtitled 'an Astronomer's View'). There are a few historical oddities and Chapter 7 on the civilisations of ancient Mesopotamia and their astronomy is idiosyncratic. Conversely, the descriptions of the modern understanding of the various astronomical phenomena are well done, and given that the book is aimed at a lay audience, using the Star of Bethlehem story as a vehicle for this material is perhaps no bad thing. The author has not been well-served by his publishers: the book would have benefited from better editing and the suggestions for further reading for Chapters 8 to 10 appear to have been omitted.

Michael Molnar was an astronomer and physicist at Rutgers University. He now works on commercial Internet software and is also an amateur numismatist. It was this interest in ancient coinage which provided the initial impetus for his ideas about the Star of Bethlehem. In 1991 he bought a coin minted in Antioch around AD 6 which showed a ram looking backwards at a star. The ram seems likely to represent the constellation of Aries which, within the precepts of the astrology of classical antiquity, was associated with the Jews and Judaea.

Molnar's book starts, like Kidger's (and Hughes'), by discussing the account of the star in Matthew, what is known of the origin of Matthew's gospel, other early Christian writers and the historical background to the story. He briefly covers the various explanations that have been proposed in the past: comets, novae, etc., only to find them wanting in one or more respect. He then describes his own explanation for the Star of Bethlehem, which is the main purpose of the book.

Like many good ideas, Molnar's insight is obvious in retrospect. It is that the Star of Bethlehem story should be interpreted in terms of the astral science and precepts of

the time, rather than according to modern ideas. Modern explanations of the Star of Bethlehem have tended to propose bright, spectacular, events which are immediately obvious. Conversely, the Magi were astrologers and the importance of astrological events depended not on their brightness, but rather on the positions of the planets within the signs and houses of the zodiac and the orientation of both the planets and the zodiac with respect to the horizon.

Molnar taught himself astrology as it was practised in classical times (a singularly thankless task which involves mastering difficult and arcane material of little apparent usefulness). He then found that around 17 April 5 BC the positions of the planets combined to yield an extremely strong portent indicating the birth of a powerful King of the Jews. He interprets this alignment as coinciding with the birth of Christ and hence being the origin of the Star of Bethlehem story. He also finds that though the original Greek of Matthew's account of the star has a literal meaning (which is how it is usually translated) many of the phrases were also technical terms in Greek astrology, and the passage makes better sense if it is translated in this light. Molnar's approach also provides a simple explanation to a long-standing puzzle about Matthew's account: why, though the Magi recognized the star, no-one in Jerusalem or Judaea appeared to notice it. Jewish religious tradition disapproved of astrology and it was not practised in Jewish communities (Deuteronomy XVIII:9-14).

Molnar's book is a significant contribution to elucidating the origin of the Star of Bethlehem story and seems a better explanation than those proposed previously. For anyone who does not wish to read the entire book he has published a paper giving a more succinct account of his ideas (Molnar 1995). He also believes that he has uncovered evidence for the Star of Bethlehem independent of the account in Matthew (Molnar 1999). The book itself is well produced and though intended for the layman is nonetheless well endowed with footnotes and references for further reading. In addition to providing a new explanation for the Star of Bethlehem the book also acts as a primer for the astrology of classical antiquity. Indeed, I thought that by concentrating on a single astrological event it nicely complemented the most recent overview of this subject, Barton's *Ancient Astrology* (1994).

There is, however, a conundrum at the heart of any astronomical explanation of the Star of Bethlehem: whether the event proposed coincided with the birth of Christ by chance or by supernatural intervention. This problem takes an extreme form in Molnar's theory, where it apparently requires astrology's arbitrarily invented rules to work. The problem does not arise if the story of the star is a fabrication. It is, however, possible to reconcile Molnar's ideas with the story being a Midrash. Recall that the author of Matthew appears to be a Christianized Jew living in Antioch, which was a Hellenized city where both astrology and the Stoic philosophy often associated with it were well established. Though the author seems unlikely to have been versed in astrology himself, he may well have known of portents predicting the birth of a Jewish Messiah around the time of the birth of Christ, and simply incorporated elements of these into his narrative. Remember that he was writing in a cultural context where the Emperor Augustus had skilfully used an auspicious horoscope as propaganda to legitimize his rule. This possibility removes the necessity for the astrological portents to actually correspond to the date of Christ's birth. The true explanation of the origin of the Star of Bethlehem story will probably never be definitively established, but in the meantime Molnar's explanation seems the most convincing available.

#### Acknowledgements

I am grateful to Mr P A L Chapman-Rietschi for useful discussions, though he would not necessarily concur with all the opinions expressed in this review.

Clive Davenhall

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*Science in Translation: Movements of Knowledge through Cultures and Time*, by Scott L Montgomery (The University of Chicago Press, Chicago & London, 2000); xii + 326 pp. US\$28.00 £18.00, cloth-only, 152 × 228 mm.

*Lingua franca*, a universal language of strict scientific discourse, is the unapproachable dream of present-day scientists. It existed for a while among medieval Europeans in the form of commonly-approved Latin but did not survive for good. Alas, it was the great astronomer Galileo who blew up this short-living frangible accord. He appealed to the larger audience and that is why he preferred to argue in the conventional Italian street-jargon. The bad example was too infectious.

History of science upholds a few problems of extraordinary significance, which seem to lay on a surface of mainstream and, therefore, have to be carefully examined but actually are not scalped and analysed by a devoted and experienced specialist. Among those are problems of production, accumulation, and dissemination of scientific knowledge due to translations from one certain language into another. These problems are a far cry of proper understanding and too many various aspects of them are false and mythological. Some novel avenues concerning those problems are highlighted in the innovative and informative scholarly book *Science in Translation: Movements of Knowledge through Cultures and Time*. Having been a part-time technical translator and qualified science writer for more than a decade, the author, a consulting geologist, is a first-hand referee for many topics he is in touch with. As a result, his original book is of genuine attractiveness for anyone who is interested in the broad scopes of history of science and especially history of Earth sciences and astronomy. There are some important conclusions in this study.

The book is composed of an introduction and three loose, weakly-connected parts. The first part envelopes more than half of the book's volume. It contains four chapters and would be the most engaging division for a practitioner in the history of astronomy. Mainly, it is committed to the translations from oriental languages to the Middle Age's Latin. In this part, the author treats particularly such issues as the creation of an intellectual environment and the transformation of the medieval Universe. He is also tracking the transfer of astronomical knowledge from the Greeks to the Near East and India. Without actual astronomical background, the author basically features the problems of interpretation of the genuine texts and the social-cultural context of such activity.

In this first part the author successfully disregards the old, long-lasting and popular myth about the direct impact of classical Hellenistic and Roman civilizations on the Western world. With solid facts in his hands, he convincingly demonstrates that the real influence seeped through from the eastern countries and such languages as Syriac, Persian, and Arabic. This is a serious setback for one of the founding misconceptions of the Western culture. The author is scrupulous in investigating the circumstances that brought those different societies into scientific interconnections.

The second part embraces only two chapters and is dedicated to the non-Western world, especially Japan. There are many interesting historical highlights in this part, which, as a rule, remain unknown to Western readers. Among the most exciting features is the strong case of the formation of scientific terminology in Japanese from the sixteenth through the twentieth century.

Finally, the third part contains a single chapter and exhibits the problems of modern scientific translation. The bibliography of the book stands out in richness and variety. It contains about 500 titles not only in English, but also in some other European languages.

Meanwhile, it is improper to evaluate this valuable book as homogeneous and focused. Its positive and negative aspects are mixed up. I do hesitate to name it a monolith monograph that exhausts the matters under consideration. In reality, it looks more like a collection of well-done essays, or case studies, each of them being deep and entertaining, that offers a lot of significant specifics. But in some essential respects the book is limited and lacks the general conceptual vision of the problems. Overall, there is no doubt that this detail-rich book will be of vivid interest for various audiences.

Alexander A. Gurshtein

*Archives of the International Astronomical Union. Inventory for the Years 1919-1970*, by A. Blaauw (International Astronomical Union, Paris, 1999), xiv + 42 pp., paperback, 234 × 165 mm.

The International Astronomical Union (*Union Astronomique Internationale*) is the premier international body for professional astronomers and was founded in 1919. Currently, there are over 8200 members from more than 65 different countries, and through its Symposia, Colloquia and triennial General Assemblies the IAU plays a leading role in highlighting major developments in astronomy.

In 1994, Professor Adriaan Blaauw, a former President of the IAU, performed a major service to astronomy by producing his masterly *History of the IAU. The Birth and First Half-Century of the International Astronomical Union* (Kluwer, Dordrecht, pp. xx + 296), and he has now followed this up with a complementary booklet dealing specifically with the archives of the Union, a topic covered in a mere three-and-a-half pages in his *History*.

In 57 pages, *Archives of the International Astronomical Union ...* provides potted biographies of successive General Secretaries of the Union through to 1970, and lists documents relating to their terms of office. Of greatest interest are 'Correspondence' files pertaining to general matters, restructuring of the IAU, Commissions, Working Groups, the organization of Symposia and General Assemblies, and publications, but there is also material on IAU finances and international astro-politics – particularly during the so-called cold war period. Another entry that particularly caught my eye was a folder titled "Astronomically Underdeveloped Countries/UNESCO involvement".

For those wishing to research aspects of IAU history, Blaauw's booklet will be an invaluable resource (along with his earlier *History of the IAU ...*), and it also refers to important source material for those investigating such distinguished astronomers as A Fowler, J H Oort, P Th Oosterhoff, D H Sadler, and F J M Stratton, all of whom served two or more sessions as IAU General Secretary.

Wayne Orchiston

*A Far Off Vision: a Cornishman at Greenwich Observatory, 'Auto-Biographical Notes'* by Edwin Dunkin. Transcribed, Edited and with an Introduction by P D Hingley &

T C Daniel [an edition of Royal Astronomical Society Additional Manuscript no. 55], (Royal Institution of Cornwall, 1999), 218 pp., ISBN 1 898166 73 0, spiral bound, £20.00, 241 × 165 mm.

Edwin Dunkin was a remarkable man. During 46 years service on the staff of the Royal Observatory at Greenwich he rose through the entire progression of ranks, from temporary computer to Chief Assistant – a record that was not equalled for a hundred years. As Chief Assistant for the last three years of his service he was deputy to the eighth Astronomer Royal, William Christie, but as this book makes clear he was the most trusted of assistants to that very demanding taskmaster, Sir George Airy.

Dunkin wrote this volume of 'auto-biographical notes' in June and July 1894 as a septuagenarian suffering from chronic deafness, "content to pass the remainder of my days in the enjoyment of comparative quietness and peace ..." In his Preface he states that the notes "were not written, nor are they intended, for publication", but should be kept private and preserved as a simple family record. His widow and son clearly honoured this intention; nothing more is known of the whereabouts of the manuscript volume until its discovery in a Southend garage in 1970, and its acquisition by the Royal Astronomical Society in November of that year. Its pages depict in detail the professional life of an astronomer at Greenwich during its nineteenth-century heyday – but they give us so much more. The social background, the pleasure Dunkin gained from personal contacts both within and outside his professional life, and especially those related to his Cornish roots, paint a much broader picture of both the man and his times. Consequently this volume is a major contribution to the historiography of science and Victorian social history, and one can only share the Editors' hopes that a century on "Dunkin ... would have excused our venturing to publish his private memoirs".

Dunkin and his younger brother Richard were the sons of William Dunkin, who had been employed as a computer for the Nautical Almanac Office for almost 30 years until his death at the age of 57. He had not wished his sons to follow in this profession, but following his early demise it was necessary for the brothers, then aged 17 and 15, to obtain gainful employment. Through the good offices of a family friend and the Superintendent of the NAO, they were appointed in 1839 as temporary computers at the Royal Observatory to work on Airy's re-reduction of the lunar and planetary observations made there in the years 1750–1830. The younger brother remained in this work for nine years, and then obtained a permanent position on the staff of the NAO where he served until his retirement.

Edwin Dunkin was however destined for higher things. After two years Airy appointed him an assistant in the newly-formed Magnetic and Meteorological Department, where he was engaged in the two-hourly programme of magnetic readings, thus adding familiarity with instruments to his computing experience. His real ambition was to work in the astronomical department, and he continued to extend and develop his astronomical knowledge to this end. When a vacancy arose in 1845 he was thus very well qualified, and had also gained Airy's trust and confidence, and was promoted to the established grade of Junior Assistant at the age of 24.

From here he never looked back. He observed regularly with the mural circle and was in charge of the reductions of the circle observations, and after six months he transferred to similar duties with the transit instrument. He was thus uniquely qualified to work with the new positional instruments then being constructed to Airy's designs. When the first of these – the Altazimuth instrument designed to obtain off-meridian positions of the Moon – was commissioned in 1847 Dunkin was appointed superintendent of the instrument, despite being the most junior of the Assistants at the time.

When Airy's great Transit Circle was completed in 1850, to replace the mural circle and transit instrument from the end of that year, Dunkin was additionally given responsibility for the determination of its instrumental errors, micrometer scale values, etc., and was one of the team of regular observers with both instruments. The book also records numerous expeditions, to carry out astronomical and geophysical work and longitude determinations, which were entrusted to Dunkin's supervision, and many other illuminating aspects of his life too numerous to list here. He was promoted Senior Assistant in 1856, and replaced Christie as Chief Assistant on Airy's retirement in 1881. He retired in 1884, being then President of the RAS which he had previously served as both Secretary and Vice President. He was elected a Fellow of the Royal Society in 1876, and became President of the Royal Institution of Cornwall in 1889. He died in 1898.

The Editors have done a fine job of organizing the text for publication, and have contributed not only a valuable and detailed introduction, but also extensive and valuable commentary in the form of fully-referenced footnotes. They are to be congratulated, as are the Royal Institution of Cornwall for undertaking the publication of a book which can not only be read with pleasure, but which is also a valuable source for historical and sociological research. Having extended this well-earned praise it pains the reviewer to have to close on a negative note. The book is nicely printed, on good quality paper, but as a reference volume it is ruined by the inexplicable and inexcusable decision to issue it with a spiral wire binding. Surely at the price – or not much more – something more permanent could have been managed? One can only hope that librarians at least will be willing to expend some of their limited resources on rebinding a work which should remain on their shelves in perpetuity in usable condition.

Gilbert E Satterthwaite

300 Jahre Astronomie in Berlin und Potsdam, edited by Wolfgang Dick and Klaus Fritze (Harri Deutsch Verlag, Frankfurt am Main, 2000), 252 pp., 20 figures, chronological survey, bibliography, name and subject indices, DM32.00, 210 × 148 mm.

Three hundred years ago, the Brandenburg Elector Friedrich III (who one year later elected himself Frederick I, King of Prussia) decided to found an Academy of Sciences and an Observatory in Berlin. In the same year, Gottfried Kirch was hired as the first astronomer of the academy, and a calendar patent was issued. The tercentenary of these three events motivated the historian of astronomy, Wolfgang R Dick in Potsdam, and the Babelsberg astronomer Klaus Fritze, to publish an anthology of studies on the interesting history of astronomy and astrophysics in Berlin, Potsdam, and their environs.

The longest contribution in the volume is Wolfgang Dick's 30-page introduction, a very carefully-researched survey of the developments, centred mostly around institutions such as the old and new Berlin observatories (the latter was designed by the world-known architect Karl Friedrich Schinkel, but unfortunately was destroyed around 1913 after the astronomers had moved to Babelsberg on the outskirts of Berlin), the Potsdam Astrophysical Observatory (founded in 1874) or the Einstein Tower (built between 1921 and 1924). His remarks about several less well-known institutes and organizations are also very useful, one example being the Astronomische Rechen-Institut. It was founded in 1874, becoming fully independent of the Observatory in 1896.

The prominent Berlin instrument makers, Pistor & Martins, who had constructed the Berlin/Babelsberg Meridian Circle, as well as many other *optici* and *mechanici* in Berlin are also thematized by Jörg Zaun in two contributions to this volume. The post-war history and relatively-recent work at the Astrophysikalische Institut Potsdam and at the Einstein Tower are covered in brief papers by Peter Notni, Jürgen Staude, Axel Hofmann, and Klaus Fritze.

In order to provide some background on the cultural meaning of calendars like the one issued in Berlin since 1700, Jürgen Hamel has contributed – in the reviewer's opinion – the most interesting paper on astronomical calendars as a source of information and *Bildung*. Basing his analysis upon a broad survey of the contents of such calendars between 1455 and 1830, we meet a motley thematic assortment of political agitation, astrological prognostication, serious popularization of scientific ideas, and general entertainment.

Annette Vogt contributed a prosopographical study of female astronomers in Berlin and Potsdam, based upon her screening of all female Ph.D. candidates at the Friedrich-Wilhelms-Universität in Berlin between 1899 and 1945. Her two case studies are Margarete Güssow and Gertrud Kobe, both of whom were active around 1933 when the Nazis came to power. Whereas the former joined the Nazi party and other NS organizations early on in March 1933 and seems to have played a rather dubious role as an informant in the following years, the latter rejected all compromise and had to leave the meteorological institute of the university in 1938. Paradoxically, she had no trouble finding employment at the Marine Observatory in Wilhelmshaven. After 1945 Gertrud Kobe could return to the university institute and even fulfilled the functions of a substitute director from 1948 on, but she only eventually got a tenured lecturing position in 1960. Both Annette Vogt's paper and Klaus-Dieter Herbst's contribution on the biography of Gottfried Kirch are rife with new material and really further the ongoing historical research.

Some of the other contributions are more like summaries of institutional history, but nevertheless very useful, especially if used in conjunction with the very good indexes of persons and institutions compiled at the end of the text, and the extensive bibliography of 350 texts pertaining to the theme of the book. Only one rather poor paper on world view and philosophy of science in the oeuvre of Hans Kienle should, in the reviewer's opinion, not have been included in this anthology which altogether is another welcome addition to the flourishing series *Acta Historica Astronomiae*.

Klaus Hentschel

*Aiming For The Stars*, by Tom D Crouch (Melbourne University Press, Melbourne, 2000), xiii + 338 pp., ISBN 0 522 84885 0, AU\$45.00, cloth.

Originally a publication of the Smithsonian Institution and written by the senior curator of aeronautics of the National Air and Space Museum of the USA, this book is a top quality description of the American space programme with the appropriate sidelines into the USSR/Russian space programmes where they competed with or ran parallel to the US efforts.

The first half of the book describes all the events (right from Johannes Kepler of 1571) that led to the first American manned space flights, highlighting very strongly the involvement of Von Braun and his German colleagues. It provides a good feel of those hectic times of the real space race. The discussion then goes through the lunar programme and Skylab, and on to the Space Shuttle, stopping virtually at the time that the International Space Station becomes the dominant feature.

In all, one chapter (perhaps too little) is devoted to the other aspects of the US space effort: the planetary missions, the scientific missions, to the extent that these were conducted by the US government.

One of the more curious anecdotes that sprinkle the book, was the effort by Buzz Aldrin to see if he could get his feet on the Moon before Armstrong, by suggesting that 'the commander should remain on board of the LM, at least for a time, to handle potential emergencies'. We all know the result. The book has few photos but that does not distract from the contents.

One irritating thing, for an Australian, occurs right on page 2 when the author provides a summary of spaceports but excludes Woomera, Australia, even though he includes Brazil that has not yet had a successful space launch from its spaceport. But, apart from that, this is a highly recommended book. Just in time for Christmas.

Jos Heyman

