Scottish literature at the University of Glasgow. It is, however, considerably more than a reprint of the first: it includes not only the text as published at the time, but also Mary Somerville's own earlier drafts. Some passages from Mary's original version were modified by the daughter, evidently in order to give her mother a less forceful and more ladylike character such as would appeal to late Victorian British ideals. On the whole, however, the changes were not numerous or particularly drastic, and Dr MacMillan truly remarks that, even after editing, the Personal Recollections had "all the immediacy of a diary" and "the seeming freshness of youth". The editor has supplied explanatory notes to *Queen of Science*, and well over three hundred brief biographies of people – family members, friends, scientists, artists, public figures – recalled by Somerville's amazingly-retentive memory over an unusually long life. An appendix gives helpful translations of interesting letters in Italian or French which are interspersed among the Recollections. Thus, through the editor's care and undoubtedly laborious preliminaries, the way is cleared for the reader to enjoy these fascinating memoirs uninterrupted. The Introduction, though occupying only some 30 pages, looks at Mary Somerville the Scot, and surveys her place, as a woman and as a scientist, in the world – or worlds – in which she moved. In addition to its literary interest, *Queen of Science* will be an indispensable aid to students of Mary Somerville's work and an important source of information for historians of nineteenth century astronomy and of science generally.

Mary Brück

The Roman Cult of Mithras: The God and His Mysteries by Manfred Clauss, translated by Richard Gordon, 2000 (Edinburgh University Press: Edinburgh) 198 + xxiv pp, ISBN 0 7486 1230 0, hard cover, price £49.50, ISBN 0 7486 1396 X, soft cover, price £16.00, 234 × 158 mm.

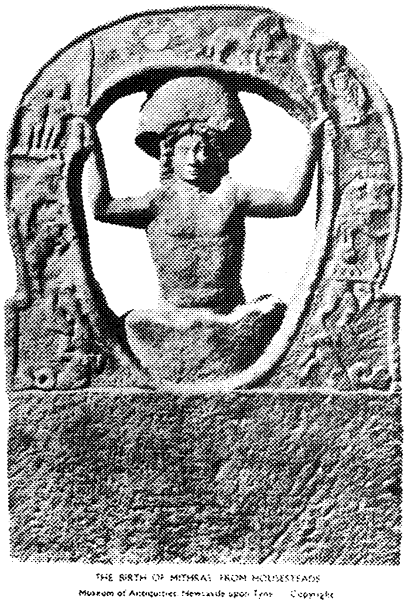
> Mithras, God of the Midnight, here where the great bull dies,
> Look on thy children in darkness. Oh take our sacrifice!
>
> *A Song to Mithras*,
> Rudyard Kipling

The cult of Mithras was one of a number of 'mystery religions' which flourished under the Roman Empire. It began to spread during the first century AD, was at its peak during the second and was extinct by AD 400. The cult was only open to men and its adherents were mostly soldiers serving in the legions, merchants, freedmen, and slaves. The congregations were kept small and met in distinctive temples, *mithraea*, which have been found *in toto orbe Romano*, throughout the Empire. However, the cult seems to have been particularly strong in Rome itself, its port Ostia and the northern provinces on the Rhine and Danube. The origins of the cult are obscure, though, like some of the other mystery religions, it is usually thought to have come from the East. Attempts, more or less convincing, have been made to link the Roman Mithras with the Persian god of light, Mitra and with Zoroastrianism. Plutarch reports that the Cilician pirates defeated by Pompey in 67 BC worshipped Mithras, though any connection with the Roman cult is conjectural.

The doctrines of the cult were secret (that is, a 'mystery') and were revealed only to initiates. As far as is known they were never written down and thus were lost when the cult died out. Such few written descriptions of the cult as survive are fragmentary and come from authors, mostly Christians, who were opposed to it. However, what has survived are examples of the decorations which adorned the mithraea. These ornaments follow a fairly standardized iconography which is both distinctive and suggestive. They are often seen as the key to understanding the cult, though any interpretation of them must necessarily remain speculative.

Much of the supporting mithraic imagery undoubtedly contains astronomical elements: representations of the Sun, Moon, planetary gods, and zodiacal constellations are common. However, the central image of the cult, present in virtually every mithraeum, is the *tauroctony* or bull-slaying. Here Mithras, always in his distinctive phrygian cap and always with his eyes averted, slays a bull, usually surrounded by a supporting cast including a scorpion, a serpent, a dog, a raven, a lion and a drinking cup. Various explanations have been offered for the symbolic significance of this enigmatic and striking tableau, and some of these have been

astronomical. In the late nineteenth century the German scholar K B Stark noticed that each of these figures corresponded to one of the Greek constellations and suggested that the tauroctony was a stylized constellation map. This idea fell from favour, but in the past twenty years has been revived by Ulansey, Beck, and others. In Ulansey's sophisticated and ingenious interpretation not only is the tauroctony a constellation map, but also the original inspiration for the motif came from Hipparchus' discovery of precession. These ideas, which remain speculative and controversial, are most fully described in Ulansey's *The Origins of the Mithraic Mysteries*.



THE BIRTH OF MITHRAS FROM HOUSESTEADS
Museum of Antiquities Newcastle upon Tyne © Copyright

Mithras born from a cosmic egg. The remains of the eggshell can be seen above and below the god, who is surrounded by an ovoid ring inscribed with the symbols of the zodiacal constellations. The sculpture was found in Housesteads Mithraeum adjacent to Hadrian's Wall. (Courtesy of the Museum of Antiquities of the University and Society of Antiquaries of Newcastle upon Tyne.)

Inevitably the interest of historians of astronomy in the cult of Mithras will concentrate on these astronomical ideas. *The Roman Cult of Mithras* is a useful corrective to this tendency. It is a modern, general introduction to the cult, firmly grounded in the archaeological evidence and with little speculation beyond it. It is similar in scope and intent to Cumont's *The Mysteries of Mithra*, which is now seriously out of date (Cumont's book was first published in 1903 and is still in print, which gives an idea of its significance and influence). *The Roman Cult of Mithras* starts by placing the cult in the cultural and religious context in which it appeared and discussing its possible antecedents and origins. Subsequent chapters cover the external attributes of the cult: its growth and eventual decay, the type of person recruited and the role of the cult in Roman society. Additional chapters describe the physical appearance of mithraea and the utensils found in them. Later chapters cover more internal aspects of the cult, insofar as these can be deduced: its doctrines and rituals and the details of the seven grades of initiate (which seem to have corresponded to the seven planetary deities of antiquity). The final chapters consider the relation of the cult to other cults and religions practiced in the Roman Empire, including Christianity.

The Roman Cult of Mithras was originally published in German as *Mithras: Kult und Mysteries* during 1990. Both the author and translator are scholars well versed in the field. The author is now a Professor at Johann Wolfgang Goethe University, Frankfurt am Main. The text has been translated well and reads naturally and clearly. It is aimed at both the general and undergraduate reader and requires no specialist knowledge to follow. The translator has added suggestions for further reading in English. The book is well illustrated in black and white, and the paperback edition, at least, is reasonably priced. It is good on the archaeological evidence, but there is no separate discussion of the written sources, such as they are, which would have

been useful. Because the book was originally published in 1990, and perhaps also because of the author's reluctance to speculate, there is little discussion of the astronomical symbolism of the cult, but the translator has included a section on this material in his suggestions for further reading. In summary, the book is a comprehensive and reliable introduction to the cult of Mithras. It can be read to gain a general understanding of the cult before following the more specialized (and speculative) literature about its possible astronomical symbolism.

Clive Davenhall

References

Cumont, Franz, 1903. *The Mysteries of Mithra* (Dover: New York; this edition 1956 and subsequently reprinted).

Ulansey, David, 1989. *The Origins of the Mithraic Mysteries* (Oxford Univ. Press: Oxford).

Walter Baade. A Life in Astrophysics, by Donald E. Osterbrock (Princeton University Press, Princeston, 2001), xiv + 270 pp, ISBN 0-691-04936-X, US$29:95, 240 × 160 mm.

It is a pleasure to read another book from the prolific pen of that master astrophysicist-historian, Donald Osterbrock, Professor Emeritus of Astronomy and Astrophysics at the University of California, Santa Cruz, and former Director of the Lick Observatory. His target on this occasion is Walter Baade, arguably the most influential observational astronomer of the twentieth century, and his aim is "... to present the known facts of Baade's life and scientific career in interesting and readable form and to let the reader draw his own conclusions ..." (page vii).

Wilhelm Heinrich Walter Baade was born in Schröttinghausen, Germany, in 1893, and trained at Göttingen University, receiving his Ph.D. in 1919 for a thesis on the spectrum and orbit of β Lyrae. Shortly afterwards he obtained a post at Hamburg Observatory where he built an international reputation through his photographic studies of variable stars, globular clusters and galaxies, and spectroscopic analyses of gaseous nebulae and selected stars. He also discovered a number of minor planets and a comet.

As an exciting interlude during this research work, Baade spent 10 days in the USA in 1925, visiting observatories in eastern states. This whetted his appetite to return and work there, which he did 1926-1927 when he held a one-year Rockerfeller Foundation fellowship, sharing his time between Harvard College, Yerkes, Lick, and Mount Wilson Observatories. After this "Wanderjahr in America", Baade returned to routine duties in Hamburg, but he hankered for a chance to work permanently in the States, using the world's largest telescopes.

In 1931 his dream came true when Adams offered him a post at Mt. Wilson Observatory. Although Baade was unquestionably well qualified for the position, Osterbrock suspects that Adams also wanted another bright, dynamic astrophysicist on staff – but this time a team-player – who could serve as a counterpoise to Hubble. Whatever the facts of the matter, Baade was in his element for "Mountain Wilson Observatory was unquestionably the most important observational astronomy research center in the world. Its 100-inch reflector was the largest telescope in existence; it and its 60-inch were both superb instruments at an excellent site ..." (page 50). Over the next decade he was involved in a range of research projects involving nebulae, globular clusters, supernovae and supernova remnants, clusters of galaxies, and he witnessed progress on the 200-inch reflector at Palomar, an instrument which he was destined to use with distinction.

Never a Nazi supporter but always a German at heart, it is perhaps ironic that Baade did some of his finest research, in America, during the Second World War, including the discovery of the existence of two distinct stellar populations, comprising young and old stars, respectively, which "... opened up the fields of study of stellar and galactic evolution that have made up so much of astronomy in our time, but which were sterile and unproductive before his discovery ..." (page 1).

One of the most interesting post-War phases of Baade's life was his involvement with radio astronomy, and this is recounted by Osterbrock in Chapter 6. From the end of the 1940s, Baade and his friend Rudolph Minkowski worked with Australian and British radio astronomers