knowledge. And frontiers are exciting but also confusing, mysterious, and rather scary places. Astronomers, being merely human, are haunted by the fact that their observations, and the inferences they make from those observations, are too often coloured by their expectations.

Astronomical research is meant to be imaginative, but rather too often astronomers overdo it. Baum's book concentrates on those historical occasions. Normal books on the history of astronomy are rather too kind. They tend to highlight the successes and overlook the mistakes. Baum does the opposite: he revels in the out-takes that litter the cutting-room floor of our past. We are treated to tales of mis-observed snow-capped mountains on Venus, cities and volcanoes on the Moon, strange stars that purport to be Planet X, mysterious bright star-like bodies near the Sun, unusual lunar occultations, and a host of suggested satellites and rings.

Astronomers also seem to be too fond of the conventional. There are many historical examples. Because the Sun was meant to be a pure unsullied golden globe, early observations of sun-spots were 'converted' into sightings of transiting inter-mercurial bodies. Because Earth has a large Moon, similar satellites were purported to be seen around Mercury, Venus, and the Moon itself.

Baum revels in the strange. He also has a commendable love of detail. I greatly enjoyed this book; there is not a dull page in it. I loved the fact that every nook and cranny of each case study was explored; notes abound and references are many. I revelled in the multitude of 'mistakes' that astronomers have made in the past, but I was also greatly impressed by the way that Baum stresses that nothing has changed. We are inevitably making similar mistakes today and still finding it hard to divorce emotion and expectation from observation. — DAVID W. HUGHES.

Von Sonnenuhren, Sternwarten und Exoplaneten — Astronomie in Jena, by R. E. Schielicke (Verlag Dr. Bussert & Stadeler, Jena-Quedlinburg), 2008. Pp. 364, 15·5 × 22·5 cm. Price €24·90 (about £17) (hardcover, ISBN 978 3 932906 80 0).

Here is an impressive historical work that we can recommend right away to people who have mastered German and are interested in the history of European astronomy — in this case *via* an astronomical 'hot spot' that shared the fate of 20th-Century Germany.

Jena is the second largest town of Thuringia (after Erfurt, the state capital). It counts today some 100 000 or more inhabitants. First mentioned in an 1182 document, Jena underwent different dependencies (the Margraves of Meissen in the 14th Century, the Saxon Elector to the German Holy Empire in the 15th Century, *etc.*) and became a strong focus of resistance to the Napoleonic occupation in the early 19th Century. Jena was incorporated into the German Democratic Republic (GDR) in 1949. Since 1990, it has been part of the Free State of Thuringia in the united Federal Republic of Germany. A list of famous citizens includes the poets Johann Wolfgang Goethe and Friedrich Schiller, the reformer Martin Luther, the philosopher Wilhelm Schlegel, as well as, closer to our interests here, Otto Schott, inventor of the fireproof glass, Carl Zeiss, founder of the Zeiss Company, and the physicist Ernst Abbe, a partner of both Schott and Zeiss.

Schielicke's book covers, throughout several centuries, the astronomy-linked activities in Jena, going from the late Middle Ages (foundation of the university in 1558) to the current investigations on exoplanets, *via* the manufacturing of optical instruments at Zeiss and more public facets such as sundials from the Middle Ages and the popular local observatory.

The titles of the successive chapters give a more precise idea of the book's contents: 'The beginnings of astronomy in Jena and the first century of the university'; 'Erhard Weidel and his works (second half of the 17th Century)'; 'Astronomy in Jena during the 18th Century'; 'The foundation of the ducal observatory in 1813 and the first directors'; 'The directorship of Ernst Abbe (1877–1900)'; 'Astronomy at Zeiss from 1897 to 1945'; 'The university observatory in the first decades of the 20th Century (directorship of Otto Knopf)'; 'The beginnings of astrophysical research in Jena (1929)'; 'The popular observatory Urania'; 'Astronomy at VEB Carl Zeiss Jena during GDR times'; 'The Karl Schwarzschild Observatory in Tautenburg'; and 'The development of astronomy at the Friedrich Schiller University (second half of the 20th Century)'.

Several appendices gather together quite interesting data (an historical profile, successive designations of the professional institutions, list of directors, schematic chronology, and astronomical objects linked to Jena, such as small planets, and craters of the Moon, of Mercury, and of Mars). Then follow a dozen pages full of bibliographic sources. An index of names concludes the book. Probably some readers would have liked to benefit from a general index — and this could be a suggestion for a possible second edition. The book contains many illustrations (over 370), unfortunately all in black and white; one would certainly have appreciated the publisher using colour for the most recent pictures. But those two reservations do not remove anything from the intrinsic interest of this formidable historical work. One would wish similar compilations could be undertaken with the same care and the same luxury of details for all major astronomy centres of the world. — A. HECK.

James Van Allen: The First Billion Miles, by Abigail Foerstner (University of Iowa Press, Iowa City), 2007. Pp. 376, 16 × 24 cm. Price $37·50 (about £19) (hardback; ISBN 0 87745 999 1).

During the last 50 years, we have sent robotic spacecraft to explore the region near the Earth, all of the planets except Pluto, and craft that are still heading toward the outer edge of the Solar System. The contributions of one man, James Van Allen of the University of Iowa, set him apart from all of the other early space pioneers as the father of spacecraft instrumentation. This biography of astrophysicist and space pioneer James Van Allen, by science writer Abigail Foerstner, places him in his times and beautifully tells us the history of the man and his scientific accomplishments. If you know anything about space exploration, you probably know of the Van Allen Radiation Belts that encircle the Earth, but you may not know that Van Allen is also an unsung hero of World War II.

Before I read this book, I was unaware that James Van Allen had helped to develop the proximity fuses used in anti-aircraft shells. Proximity fuses cause a shell to explode when it gets near an aircraft, so it does not have to hit the target in order to bring down the enemy plane. Shortly after thousands of these shells were delivered to the American troops in the South Pacific in 1943, the shells began failing to explode. Van Allen was sent out to the Pacific to find out what was the problem. He discovered that the batteries in the shells were deteriorating. Van Allen and a crew of navy gunner's mates worked around the clock in the heat and sultry humidity at Tillage to replace thousands of shell batteries. The secret proximity-fuse-armed shells were then very effective in shooting down hundreds of Japanese fighters in defence of Allied naval forces.

James Van Allen's greatest achievements centred around his teaching physics and astronomy at the University of Iowa, which in turn supported his efforts to explore the source of cosmic rays and his discovery of the radiation belts that bear