Leviathan, to the effect that "some fool has claimed to build a telescope more powerful than my brother's 40-foot". There is nothing new, it would seem, about aperture-envy.*

Yours faithfully,
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REVIEWS

Supernova, by Or Graur (MIT Press), 2024. Pp. 212, 17·5 × 12·5 cm. Price $16·95 (about £13) (paperback: ISBN 978 0 262 54314 9).

MIT Press recently launched a set of small books in their Essential Knowledge series; their website currently lists 27 titles on a wide variety of topics, from Astronomy to Whiteness. The astronomy category comprises two quite separate volumes, although on related topics, *Galaxies* and *Supernova*, both by Or Graur. They are pocket-sized volumes, and (if the book under review is typical) avoid mathematics but have copious references (by endnotes) to more technical material, all gathered at the end by chapter.

The style makes for easy reading, but a lot of information is included, from the earliest observations by the Chinese and the Romans (that surprised me — I don't think of the Romans as observers of the sky) to the present day. Apart from the historical introduction, the seven other chapters generally take a theme and develop it. The book is well illustrated, with a mixture of diagrams, graphs, tables, black-and-white photos, and eight colour plates. There is a useful glossary and a couple of pages of definitions. I am not an expert on supernovae, but I believe that he covers all the necessary topics at a level suitable for the layman. An unusual feature is a series of pages with a key quotation (usually a single sentence) from his text, printed in large font in white on a black background. Reading only these pages would give readers a reminder of key points and probably tempt them to read more.

The price is very reasonable, and I can recommend this book unreservedly. — Robert CONNON SMITH.

*Rosse's own 72-inch, as is well-known, came in for its own fair share of this quite apart from Caroline's sour remark, as, for instance, the comment of a visiting French astronomer who said that he was shown something "they told me was Saturn"! Anyone familiar with the use of large reflectors at low-altitude sites knows full well how temperamental they can be and how hyper-sensitive to the effects of seeing, so it is absurd to attribute this unbelievably poor performance to the optical quality of an instrument which had easily split γ^2 Andromedae when at 0·6 arc seconds separation.

Galaxies, by Or Graur (MIT Press), 2024. Pp. 195, 17·5 × 12·5 cm. Price $17·95 (about £14) (paperback; ISBN 978 0 262 54875 5).

According to the Foreword, books in MIT's *Essential Knowledge* series supply "foundational knowledge that informs a principled understanding of the world", which sounds a rather esoteric aim. Fortunately, the present book is much more interesting and informal than that introduction might suggest. The level would be suitable for, say, A-level school students or anyone with a general interest in science. The topics covered are wide-ranging, some history of the subject, galaxy types, structure of the Galaxy, star formation, supermassive black holes, clusters and the cosmic web, dark matter and energy, a spot of cosmology, galaxy formation, evolution, and mergers. Some colleagues may be a bit aggrieved at the shortage of mentions of X-rays, but largely the contents are as you might hope. There are a few things you could quibble about slightly, but (as the author quotes from *The Hitchhikers Guide to the Galaxy*), I think we can judge them "mostly harmless". Large numbers of references to original papers are included in the Notes, which is unusual for a book of this type, though I can't help thinking that going straight from reading an introductory text to, for instance, Binney & Tremaine's *Galactic Dynamics* could be somewhat ambitious, not to mention Einstein's *Kosmologische Betrachtungen zur allgemeinen Relativitätstheorie*. The book ends with things the reader can do besides reading, such as joining Galaxy Zoo or finding a dark-skies site. All in all, an excellent, short, non-mathematical introduction. Recommended. — Steve Phillipps.

The History of Our Universe in 21 Stars (That You Can Spot in the Night Sky), by Giles Sparrow (Welbeck), 2023. Pp. 351, 20 × 13 cm. Price £9·99 (paperback; ISBN 978 1 80279 505 9).

Having read another book[1] by the same author (positively reviewed in these pages[2]), I expected an enjoyable, well written, informative, and non-technical popular-science book; I was not disappointed. As the title indicates, twenty-one stars (and three 'impostors') are used as jumping-off points to illustrate aspects of stellar structure and evolution (and a bit more *via* the impostors) as well as basic astronomical knowledge such as distance determination and the main points of the history of astronomy. Each object has a finding chart and description of how to find it, also indicating its magnitude and what type of instrument, if any, is needed. The impostors are the globular cluster Omega Centauri, the Andromeda Galaxy, and the quasar 3C 273. As in the recent review[3] of another book[4], the only real mistake I noticed was towards the end of the book in the discussion of cosmology (jumping off from supernova 1994D to the magnitude–redshift relation for type-Ia supernovae and to observational cosmology in general): while it is a matter of taste whether one describes the cosmological constant as getting stronger over time (by definition, it is constant, though its effects dominate more and more over those of matter as the latter is thinned out by the expansion of the Universe), the 'Big Rip' scenario, in which even (gravitationally or otherwise) bound objects will be disrupted, will not happen if dark energy is just the cosmological constant, but rather involves a more exotic form of dark energy. (It is also probably not the case that the Michelson–Morley experiment influenced Einstein's thinking on Special Relativity, but any mistake here is more than made up for by the mention, in the same footnote, that Michelson appears as a character in an episode of the US Western television series *Bonanza*[5,6]. Interestingly, Lorne Greene, who played one of the main characters, Ben Cartwright, in *Bonanza*, later moved

to the stars, playing Commander Adama in the science-fiction television series *Battlestar Galactica* in the late 1970s.)

Although essentially no readers will be able to connect their own observations of the objects mentioned in the book with their scientific descriptions, the format nonetheless thus bridges the gap between amateur astronomy on the one hand and astrophysics on the other; the latter is presented non-technically but clearly and without loss of accuracy. The book also contains many footnotes providing tangential information. Somewhat odd is the reference format (for the handful of citations per chapter): title, author, year (*i.e.*, no journal or other information). While that is probably enough to track them down, full references and/or DOIs would have taken up negligible additional space.

Apart from the twenty-four chapters and the reference list, the book contains essentially only a page of acknowledgements and an introduction. In addition to the finding charts (with the figures represented by the constellations as grey backgrounds), there are a few other black-and-white diagrams and photos spread throughout the book as well as occasional 'boxes' with additional information. As usual, the editing could have been somewhat better, though there are only a few actual typos.

Using specific celestial objects as jumping-off points to discuss various astrophysical topics in more general terms is also the strategy used in another book[7] reviewed in this *Magazine*[8], although that book, fitting for one on galaxies, contains many large, high-resolution colour photos. That doesn't make sense for a book mostly about stars, though the idea of moving from what one sees in the sky to the physics behind it is the same. This could be a good first book on (mainly stellar) astrophysics for someone interested in astronomy. — Phillip Helbig.

References

(1) G. Sparrow, *50 Astronomy Ideas You Really Need to Know* (Quercus), 2016.
(2) P. Helbig, *The Observatory*, **137**, 30, 2017.
(3) P. Helbig, *The Observatory*, **144**, 295, 2024.
(4) S. Graydon, *Einstein in Time and Space* (John Murray), 2023.
(5) https://bonanza.fandom.com/wiki/Look_to_the_Stars
(6) https://www.youtube.com/watch?v=2D1kIdoCrak
(7) M. König & S. Binnewies, *The Cambridge Photographic Atlas of Galaxies* (Cambridge University Press), 2017.
(8) C. Potter, *The Observatory*, **138**, 338, 2018.

An Introduction to Mathematical Astrophysics, by Neil R. Taylor (Observatoire Solaire), 2024. Pp. 317, 27 × 19 cm. Price £37 (on Amazon), £35 (directly) (hardbound; ISBN 978 1 9999044 2 5).

This book is intended for students with A-Level mathematics and physics, first- and second-year undergraduates in physics and astronomy, and amateur astronomers. In a little over 300 pages, it covers a vast amount of material, from history, through Solar System and dynamical astronomy, stellar astrophysics, the Galaxy, galaxies, cosmology, Special and General Relativity, and just about everything you want to know about astronomy. The author obviously has a huge comprehensive knowledge of the subject — but how successful is he in putting it over for the intended readership?

Unfortunately, it appears to have been privately published and printed, and has doubtless never been through the hands of a copy editor. While, like the curate's egg, it may be good in parts, I think I can safely say that I have never seen a book so riddled with mistakes on page after page from start to

finish. These include mistakes in science, in mathematics, grammar, spelling, punctuation, and sentence structure, as well as the appallingly poor typesetting of mathematical symbols and equations to such an extent that I cannot honestly say that I recommend the book to anyone who is trying to learn from it.

To list all the mistakes would probably take up an entire issue of *The Observatory,* so I'll just choose a random few. Among the more amusing spelling mistakes are Harlow Shapely and discreet energy levels. As for punctuation, Lynne Truss (of *Eats, Shoots and Leaves* fame) would have a field day, with a vast mine of mistakes to choose from. Suffice it to say that the author seems to have no idea whatever of the use of apostrophes, commas, or hyphens. Among the many scientific mistakes, we are told that hadrons are mesons and muons, that a pion is the lightest of the muons, protons and neutrons are bosons, and electrons are baryons. We are also told that a black body absorbs no radiation. Cool objects don't emit any radiation below a threshold (a falsity obviously caused by a misinterpretation of the Planck curves illustrated just below it). In the Sun's spectrum, the atomic hydrogen emissions are a very distinct case and "shine-out" as bright lines against the backdrop of the continuum spectra. Type Ia supernovae emit silica lines. Faraday showed that magnets move within an electrical conductor. The pressure of a gas is not a scalar nor a vector, but a tensor. (Spectroscopy shows that) the coma of a comet consists predominately [*sic*] of (atomic) hydrogen. In neutron stars, electrons are accelerated by magnetic fields. You may remember from school physics that blue light is refracted less that red light. (Gosh — I'd forgotten. I thought my teacher said "more than" — did he get it wrong?). This is why our sky is blue. The atomic mass of helium is 2. (The author also confuses atomic weight with mass number, and tells us that the atomic weight must be written to the lower right of an element's symbol.) A globular cluster has lots of high-metallicity stars. Fe^{13+} is atomic iron with 13 of its 16 electrons missing. Methane, water, and carbon dioxide are diatomic elements. And so it goes on and on.

I'll give an example of just one mathematical derivation. We'll calculate the angular momentum of a solid rotating star. (I'm not sure what a solid star is.) The angular momentum of a closed system is *Smvr*. (We are not told what a closed system is or what the symbols stand for.) If we consider the scenario of a solid rotating star, we can integrate over the whole star and arrive at the angular momentum of the star as *MRv*, where *M* is the mass of the star, *R* its radius, and *v* the speed of rotation. Such is the quality of the mathematical derivation — and, of course, the wrong result. For a solid sphere of uniform density, the angular momentum would be only 40 percent of this. For a real, gaseous star, its angular momentum is nothing at all like this.

I think I have written enough. A brief summary, I'm afraid, is that I cannot recommend this one to those trying to learn mathematical astrophysics. — Jeremy B. Tatum.

The Enchantement of Urania: 25 Centuries of Exploration of the Sky, by Massimo Capaccioli (World Scientific), 2024. Pp. 573, 23·7 × 15·7 cm. Price £135 (hardbound; ISBN 978 981 124 777 4).

Massimo Capaccioli climbed five rungs of the academic ladder at the University of Padua from 1969 until 1990, becoming full professor, then moved to the University of Naples as full professor in 1995 (where he was also director of the observatory 1993–2005), becoming an emeritus towards the end of 2014. He was also a visiting professor at the University of Texas and counts Gérard

de Vaucouleurs as a mentor. He has (co-)authored more than a dozen books, mostly in Italian (some of which have been translated to other languages). This book is his own translation of the 2020 Italian version, the latter of which he had been working on since 2011.

This is a history of astronomy, but different from others which I have read, for several reasons. Although the topics covered in the 19 chapters are more or less what one might expect (with a slight preference for observation and instrumentation over theory), the fact that the chapters are the only division (no parts, sub-chapters, sections, *etc.*) reinforces the similarity of the narrative to myth (in a positive sense). Apart from the subject matter, the style reminds me of a bard recounting an oft-told tale, with a clear narrative peppered with asides and allusions which keep the narrative interesting without detracting from it. There are 1213 footnotes providing additional commentary, citations to the literature (including some to this *Magazine*), or both, and the main text often follows separate strands which are braided together.* (The citations, while accurate, are sometimes to surprising sources, perhaps reflecting the author's personal source of the corresponding information, rather than some standard citation.) While none of the main points were new to me, I encountered several details for the first time (some similar to the biographical details presented by Steven Phillipps in his recent historical series in these pages). While it is a history of (mostly Western) astronomy, political and other details of the corresponding times are also mentioned to provide context.

There are no equations, making the book accessible to a wide readership, though without too much simplifying of concepts. Perhaps unexpected for such a book, there are no illustrations whatsoever, apart from the cover featuring a painting of the muse Urania superimposed on a wide-field image containing stars and galaxies. Not surprisingly for an historical, as opposed to systematic, presentation, astronomers play as much a role as does astronomy. The nineteen-page index contains only names. One of those is Archbishop Isidore of Seville (560–636), quoted explaining the difference between astronomy ("the study of the stars") and astrology ("the superstitious line of thought"); many books on astronomy claim that there was essentially no difference between astronomy and astrology until much later (though to be sure some did both); a reference to the original Latin text is provided. Other titbits new to me were how Ptolemy measured the magnitudes of stars (based on their time of appearance at sunset) and that γ Draconis will be the brightest star in our sky in 1·5 million years (one of many interesting facts revealed in a long footnote when the star is mentioned in the main text because it culminates over Greenwich). The book is full of such delightful excursions. Although most topics one would expect are covered, the level of detail varies. Some are mentioned in only one sentence (perhaps with a footnote citing an entire book on the topic), others get a paragraph or two, and still others, such as the construction of the 200-inch *Hale* telescope, get several pages. (There is an entire chapter 'The Eighth Wonder', but it also includes many pages about Walter Baade and Bernhard Schmidt in Hamburg, Baade and Zwicky in California, and the history of the Schmidt cameras in Hamburg, at Palomar, and elsewhere, and the surveys made with them.)

*The range of knowledge of the author, indicated not just by the main text but especially by the footnotes, is vast. Both the main text and the footnotes refer to the main topic of the book, interesting additions, and broader historical and literary contexts, often in interesting superpositions, somewhat like adding a footnote about the Maxwell equations to Walt Whitman's "I sing the body electric".

Of course, in a book of this length, it would be a surprise if there were no mistakes at all, but they are mostly harmless: in addition to typos and linguistic errors typical of Italian speakers — though the translation is on the whole good — sometimes unimportant (for this narrative) details are wrong, *e.g.*, Max Born emigrated to the UK, not as stated to the USA, the ESO headquarters were first briefly in Hamburg before Geneva and then Garching (only the last two are mentioned), and sometimes relatively common myths are repeated, *e.g.*, that Einstein was led to Special Relativity *via* the Michelson–Morley experiment. Some matters of style and so on could have benefitted from better proof-reading, but other things, such as mis-spelled names, would need a proof reader familiar with the well-over-one-thousand names mentioned in the book (though different spellings of the same name should have been easy enough to spot). The author seems to be very well informed, so I was surprised that he thinks that there is more than just a shadow of a doubt on Eddington's interpretation of the famous 1919 eclipse-expedition results, as that long-standing myth has been convincingly debunked[1,2]. The back-cover description states that "[a] rich bibliography has also been added in the appendix", but there is no appendix at all. (The citations, though, contain full bibliographic information, including titles, issue numbers, and first and last page numbers.*)

However, in comparison to the treasure-trove of information contained in this tome, my complaints are minor. It is both a good introduction to the history of astronomy for someone who knows little or nothing about that field, but also an enjoyable read for those who know considerably more. Probably everyone would learn many new interesting things, and it is also valuable for its many citations to the primary literature, including the sources of quotations, of topics mentioned in the text. — Phillip Helbig.

References

(1) D. Kennefick, *No Shadow of a Doubt: The 1919 Eclipse that Confirmed Einstein's Theory of Relativity* (Princeton University Press), 2019.
(2) D. W. Hughes, *The Observatory*, **139**, 245, 2019.
(3) G. E. Christianson, *Edwin Hubble, Mariner of the Nebulae* (Farrar Straus & Giroux), 1995.
(4) D. J. Stickland, *The Observatory*, **117**, 325, 1997.

Here and There

DANGEROUSLY OUT OF FOCUS

The Cassegrain focus — effectively the lens — of the Subaru telescope atop the Mauna Kea volcano in Hawaii — *New Scientist*, 2023 January 23, p. 31.

*As a reference to Hubble's enormous ego, Capaccioli cites the definitive biography[3] (reviewed by our long-standing Editor[4]) and explicitly "pp. 1–420" (*i.e.*, the entire book).