

Once the premier spacefaring nation in Asia, Japan is now left in China's shadow. However, the future still holds much promise, including missions to Mercury and the moons of Mars, and the long-term prospect of Japanese astronauts setting foot on the Moon and driving roving vehicles across its surface. — PETER BOND.

How to Write and Publish a Scientific Paper, 9th Edition, by Barbara Gastel & Robert A. Day (Cambridge University Press), 2024. Pp. 348, 23 × 15 cm. Price £27.99/\$34.99 (paperback; ISBN 978 1 009 47753 6).

If you are an established professional scientist, you probably think you already know how to write a scientific paper, and of course that's essentially true. But a quick glance at this book might be enough to tell you that you still have things to learn. For first-time paper writers, it will be very useful indeed. This is the ninth edition, which argues that people do find it helps them.

When I looked at the list of contents, I was not surprised. Every conceivable topic is covered, together with quite a few that I would not have thought of. There are eight main sections: 'Preliminaries' (including such basic topics as What is Scientific Writing? and What is a Scientific Paper?); 'Preparing the Text', with subsections on all the necessary parts from Title to References; 'Preparing the Tables and Figures'; 'Publishing the Paper', starting with an explanation of Copyright; 'Doing Other Writing for Publication'; 'Conference Communications'; 'Scientific Style' (including Use and Misuse of English); and 'Other Topics in Scientific Communication', including How to Write a Thesis and How to Work with the Media. There are four useful Appendices (including Words and Expressions to Avoid, with two columns: Jargon and Preferred Usage; we would all benefit from looking at that one).

The text is clearly and logically written, so the book is a pleasure to read. It is lightened from time to time by relevant cartoons, including two from Peanuts. There is a pertinent quotation at the head of each of the 42 sections (*e.g.*, "Manuscripts containing innumerable references are more likely a sign of insecurity than a mark of scholarship", attributed to William C. Roberts). There is a glossary, a list of References, and an Index. A very useful reference book for all scientists who want to have their work read — and that's all of us, isn't it? — ROBERT CONNOR SMITH.

Pisgah Astronomical Research Institute: an untold history of spacemen & spies, by Craig Gralley (History Press), 2023. Pp. 158, 22 × 14 cm. Price \$23.99 (about £19) (hardbound; ISBN 978 1 4671 5218 1).

PARI, the Pisgah Astronomical Research Institute, was founded in 1998 by Don Cline and his late wife, Jo. It now focusses on both live and remote astronomical education and also houses many collections of astronomical glass plates, deaccessioned by Harvard and many other observatories. But the site started life as a NASA tracking station (1963–1981) and next was owned and operated by the US National Security Agency (1981–1995). The author is a former senior executive of the US Central Intelligence Agency. The above is meant to be an 'other books received' summary.

A review would continue: It isn't often that a book, especially a history book, hits one's mailbox just in time to provide a slice of information needed for the next day's teaching. But this one did. In its tracking-station days, the two 85-foot-diameter radio dishes could pick up the signal from a 5-Watt source on a satellite 200 000 miles away. How much is that in janskys? Well, for some

plausible source of frequency and bandwidth, it's about one. That was indeed the faint end of the radio-source counts in the early days of Big Bang *versus* steady state, Ryle *versus* Hoyle, and so forth, and the very brightest radio sources ranging up to maybe a kilo-Jy. How much is a jansky? It is 10^{-26} watts per square metre per hertz. (Remember that the limiting sensitivity of human hearing is somewhere around 10^{-12} watts per square metre over some frequency range, maybe 300–6000 Hz.)

Why did the book arrive on my desk? It was a present from PARI founder, Don Cline (a friend of long standing) and the author Craig Gralley, each of whom autographed an early page. It has 125 informative footnotes, a short index, some historical black-and-white photos, and some perfectly lovely colour ones, including the PARI campus at night, illustrating how to illuminate grounds and buildings, while sending very little light upward to undarken the dark night skies of rural North Carolina. The AAATS-3 satellite that took the first colour photograph of the whole earth in 1967 and the first *Earth Resources Technology Satellite* (ERTS) were both commanded from the PARI site, when it was called NASA's Rosman Station. The ERTS image provided shows New Jersey and was taken on 1972 November 10.

Cline himself is a meteoriticist, and one of the colour photos shows him holding up a piece of chondrite close to three young female students. Two of them look frightened. Perhaps they are remembering the DoD days? Had it ever occurred to you that radomes not only keep the rain off, they keep cameras that pass overhead (on the Other Guy's satellites) from seeing where your spying dishes are pointed. There are lots more photographs and many more unexpected pieces of information. Many thanks Don and Craig! — VIRGINIA TRIMBLE.

General Relativity: The Theoretical Minimum, by Leonard Susskind & André Cabannes (Penguin), 2023. Pp. 387, 20 × 13 cm. Price £10.99 (paperback; ISBN 978 0 141 99986 9).

Leonard Susskind has been a professor of theoretical physics at Stanford for almost five decades. He is best known for his technical work on string theory and various applications of quantum theory. This book is one of many*, with various co-authors, based on his lecture series *The Theoretical Minimum*; the lectures themselves are available as videos on the internet. This is the first book in the series which I have read. Books on General Relativity can be divided into physics-first or maths-first and of course also differ with regard to breadth, depth, and level of (mathematical) detail. This book is rather different in that it is neither strictly maths-first nor physics-first, although it does follow the common pattern of an introductory physics chapter, then a few chapters on maths, before moving on to discuss applications. However, rather than deliver essentially all of the maths first, Susskind presents the basics of tensors, curvature, geodesics, and metrics before three chapters on black holes, but in those chapters brings in more maths (*e.g.*, various types of coordinates) as needed. The Einstein field equations don't appear until the ninth chapter, before the final one on gravitational waves.

It also differs from most other books in that the basic concepts are presented in enough detail actually to learn them relatively easily. However, the details are conceptual, not necessarily mathematical. The emphasis is on understanding,

*So far, there are also books on classical mechanics, quantum mechanics, and classical field theory and Special Relativity. The next volume will be on cosmology, followed by one on statistical mechanics.