

Book reviews

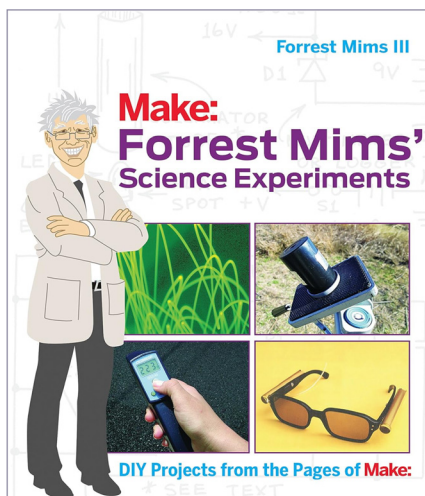


Make: Forrest Mims' Science Experiments

Forrest Mims III

Sebastopol, CA: MakerMedia, 2016

ISBN 978 1 680 45117 7



Having originally been published in 2016, this is clearly not a new book but if it isn't already in your school library then it deserves to be added. The justification for this comes from the wealth of projects presented, combined with the author's very last sentence of his final chapter: 'My view is that every project is like a course in tech school or college'.

The first project is a study of tree rings and it guides the reader through sample preparation, observation and analysis. Recommended software and further reading are provided via two weblinks but, at the time of writing, one has a redirect and the other returns a *Not found* message. This is an inevitable consequence of online evolution, but savvy users will be able to work their way around these issues by searching for the specific content required.

Later projects range from a kite-flown air sampler to construction of a twilight photometer. All have their

roots in Forrest Mims' contributions to *Make: Magazine*, which explains their heavy reliance on practical skills. This is important because *doing* science is much more impactful than simply reading about it, and students who are inspired to explore any of the projects will gain hands-on expertise as well as technical and subject knowledge.

It is a sad fact that there are not enough current books encouraging students to perform their own hands-on investigations, which is why this volume still stands out and is worthy of consideration nearly a decade after its publication.

Some of the electronics aspects extend beyond common school curricula. Older students may already have wondered whether light-emitting diodes can be operated in reverse, transferring photon energy into electrical energy, and Forrest Mims shows that not only is this possible but that it can be advantageous in terms of spectral selectivity.

Most of the projects can be developed safely without any special precautions, and the book assumes readers will generally exercise common sense to ensure their own self-preservation. That said, there are specific instructions about how to avoid looking directly at the Sun when photographing its aureole.

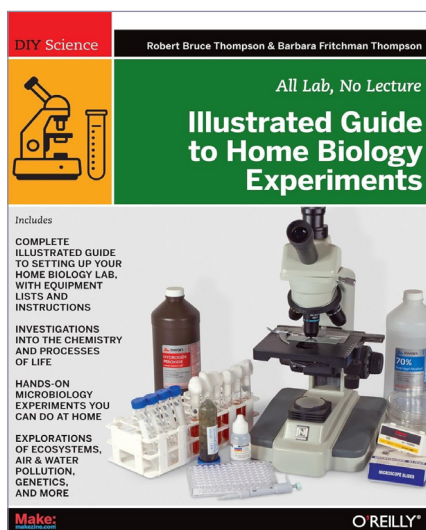
Parts of the book may seem overly American (the chapter devoted to former President, Thomas Jefferson) or a little self-indulgent (two chapters about the Altair 8800 computer), but the author's inspirations and experiences, both successes and failures, are useful life stories for any student who might subsequently embark on his or her own inventive and entrepreneurial adventures.

Jon Tarrant

Semi-retired A-level physics teacher and author/photographer based in Jersey. Creator of the physbang.com blog

Illustrated Guide to Home Biology Experiments: All Lab, No Lecture

Robert Bruce Thompson and
Barbara Fritchman Thompson
Sebastopol, CA: O'Reilly, 2012
384 pp, £24.00
ISBN 978 1 44939659 6



This book is designed for an American audience, so there are some Americanisms that need to be taken into consideration, such as going to a 'drug-store' to buy equipment to set up a home laboratory.

The book aims to tell us everything we need to set up a home biology laboratory. It is aimed at American high-school-age students, including those being home-schooled. The book first gives a comprehensive guide to equipment required, such as microscopes, autoclaves and incubators, going into great detail about how to choose suitable items. The beginning of the book also covers safety, including a section headed 'Don't do stupid things'. Although the book covers how to use equipment carefully, I am not sure it fully replaces the impact of a real person teaching a student how to work safely in a lab.

Following the general equipment section, the book is conveniently organised into separate themes of practical experiments, such as *Air pollution testing* and *Exploring Mendelian genetics*, making the book very easy to navigate. Within each chapter there are very detailed notes on equipment needed for each experiment and how to do the practical. Coloured images and review questions further assist.

Overall, the book is well structured, well written and makes an interesting read. It would not be particularly well placed in a high school library, as the practicals

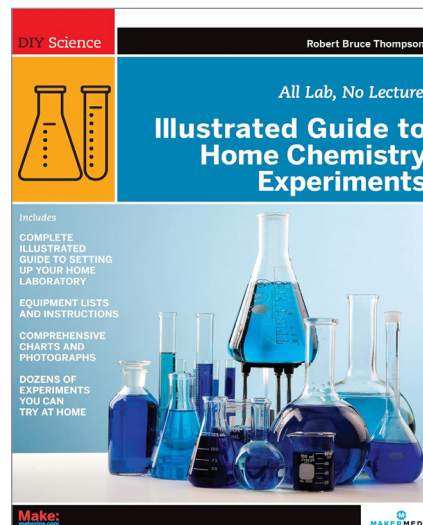
are extremely detailed and complex in places. There would also be some big safety concerns about a 15-year-old culturing bacteria in a household incubator and storing chemicals. I would even have reservations about an older hobbyist doing these without any real training. Although interesting, many of the practicals are not part of the UK curriculum. However, some of them would be a welcome addition in the classroom under the supervision of a teacher.

In the UK, this book would be most suitable for a teacher, to provide more practical ideas to support students' learning. For example, the practicals investigating Mendelian genetics and observing specialised eukaryotic cells.

Colette Christian
Science teacher, Bolton School

Illustrated Guide to Home Chemistry Experiments: All Lab, No Lecture

Robert Bruce Thompson
Sebastopol, CA: O'Reilly, 2008
415 pp. £23.99
ISBN 978 0 596 51492 1



This is a splendid book – but it is not really for the people who would be attracted by its title! Leave out the word 'Home' and that's a different matter. I should explain ...

All Lab, No Lecture, this book's subtitle, is very clear, and it is also accurate because you really do need a lab to carry out most of the practical work in this book. Chapter 3, almost 20 pages on equipping a home chemistry lab, makes this very obvious. Then there are 15 pages of Chapter 4, all about the chemicals you will need. There is a brief chapter on lab safety, full of

common sense and very laudable, and then there is the meat of the book, which is substantial: more than 60 laboratory procedures and determinations are set out in full detail. Each 'lab', to use the American term, is presented with a working procedure, an equipment list, safety notes, possible substitutions and modifications, and disposal instructions. There is often a guide on recording the outcomes, and sometimes a paragraph from an external commentator offering context or related trivia. Then there are optional extension activities and review questions – complete with space to fill in the answers.

Altogether this is a very thorough and – yes – a splendid book. Many of the 'labs' it describes would translate straight into a British school laboratory, and all of them would provide a teacher of A-level chemistry with helpful guidance on the practical work associated with the course. One disappointment is

the relative neglect of syntheses. Many of the labs are to do with physical chemistry and quantitative and qualitative analysis. At the very end we get to make aspirin and rayon, and there's some forensic chemistry – but taken as a whole the choice of topics (though not the way they are developed) tends to present chemistry as a pretty dry and traditional discipline. Nevertheless, there is a lot here that a chemistry student will be expected to know and experience by the age of 18.

Tempted? Take a look at the sample pages on Amazon for a full contents list and all the introductory material, including the safety briefing. This is emphatically not a 'home chemistry' book, but every new chemistry teacher should have a copy!

Colin Johnson

Former head of science, chemistry education lecturer and CEO of the Techniquet Science Discovery Centre in Cardiff

These reviews are the opinions of individual reviewers and are not an official ASE view or endorsement of the resource. Reviewers are selected on the basis of their experience and interests and are expected to draw attention to perceived weaknesses or limitations of a resource as well as strengths. Reviews are written from the standpoint of someone seeing the materials for the first time and considering how they would use them or think colleagues would be likely to use them.

Do you have any students who may be interested in writing a student book review?

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See page 75 for the latest student reviews.

Maria Kettle, Book Reviews Editor, worked as a physics teacher in sixth-form settings for 18 years, then for 11 years as Outreach Officer, Department of Engineering, University of Cambridge.

Student book reviews

Post-16 students review books that have grabbed their attention

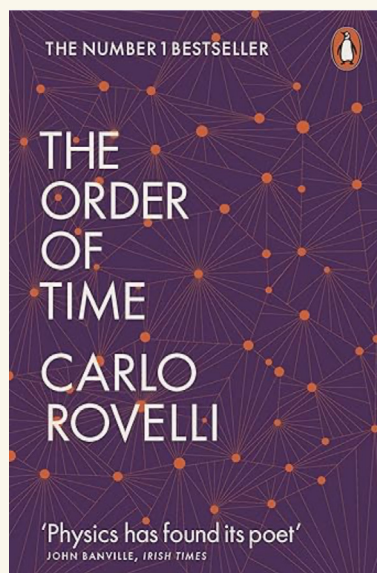
The Order of Time

Carlo Rovelli

London: Penguin 2019

224 pp. £9.75

ISBN 978 0 141 98496 4



Have you ever wondered what time is? Over 26 centuries, philosophers and physicists were debating this. *The Order of Time* takes us on that journey to understand time.

Time is experienced differently by everyone: a watch placed lower down is slower than a watch higher up. Time does not flow: time only takes certain quantities, so time is discrete. There is no present: now and here are not the same for everyone. There is only a continuity from the past to future with no definite present. These are some of the ideas developed on what time is by Carlo Rovelli. This book challenges your perception of reality as well as introducing quantum physics. Rovelli writes with simplicity so the reader can confidently follow through with the diagrams. His books are an excellent way to get familiar with physics, even if you do not know much about it.

The reflection, how we ourselves are time, is a philosophical approach to what time is. I chose this book as it revealed the relationship between physics and philosophy, which I am deeply interested in, and is a great option for wider reading specifically on quantum physics theories.

Weronika Slomka

Haberdashers' Monmouth School

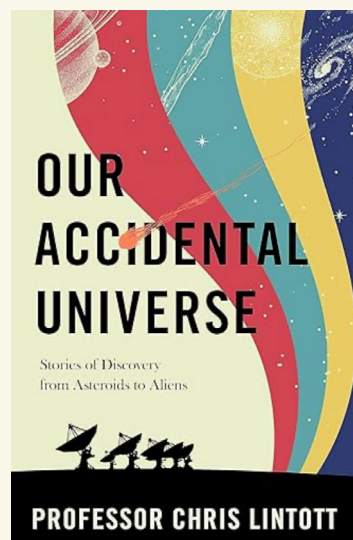
Our Accidental Universe: Stories of Discovery from Asteroids to Aliens

Chris Lintott

London: Torva, 2024

272 pp. £16.16

ISBN 978 1 91170918 3



I decided to read this book after seeing a lecture on accidental discoveries in astronomy by Professor Chris Lintott, who co-presents the BBC television programme *The Sky at Night*. The book lived up to my expectations, as it explores this immensely fascinating subject in depth, looking at aspects such as oceans on Saturn's moon Enceladus, the strange interstellar object Oumuamua, pulsars, the cosmic microwave background and the Hubble Deep Field.

My favourite aspect of the book is the wide range of topics covered, which makes the book engaging to read while demonstrating the depth of the subject, helped especially by the author's witty, humorous style and entertaining footnotes. The author has made great efforts to make the book accessible for non-experts by clearly explaining key information, although I feel a basic background knowledge of astronomy is required for readers to get the most out of it. The topics discussed often spread into areas outside astronomy, which helps to create a broader perspective.

With the author's enthusiasm being clear on every page, I would recommend this book not only to those interested in astrophysics, but also to those interested in scientific progress, discovery and open-minded exploration of the universe.

Raafey Huda

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