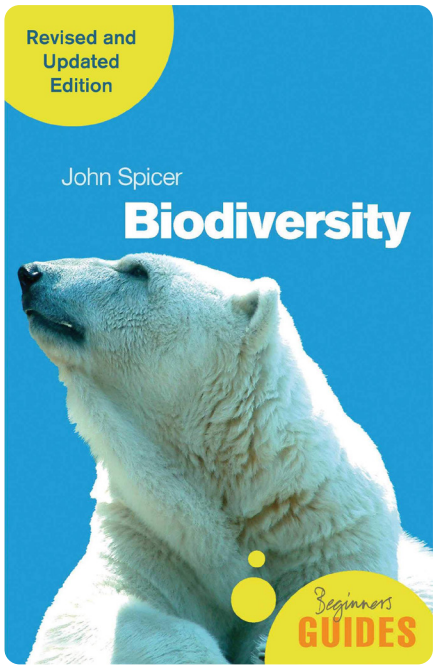
Reviews

Reviews published in *School Science Review* are the opinions of individual reviewers, and are not an official Association for Science Education (ASE) view or endorsement of the resource. Reviewers are selected to write reviews on the basis of their experience and interests. They are expected to draw attention to perceived weaknesses or limitations of a resource as well as its strengths. The reviews are written from the standpoint of someone seeing the materials for the first time and considering how they themselves would use them, or think colleagues would be likely to use them.



Biodiversity: A Beginner's Guide

New edn. John Spicer
London: Oneworld, 2021
246 pp. £9.99
ISBN 978 1 86154 017 4

Starting with a quote by Swedish climate activist Greta Thunberg, this revised and updated edition of Spicer's book, originally published in 2006, aims to provide a comprehensive account of many aspects of biodiversity. Opening with an explanation of systems of classification, Spicer goes on to discuss, *inter alia*, the politics and geography behind biodiversity, the history of extinction and the role of humans in the current biodiversity crisis. The final chapters show the current state of international agreements and the role of the individual.

Although marketed towards the general reader, *Biodiversity: A Beginner's Guide* is rather too dense and dry to appeal to all but the most determined. While a number of black-and-white printed diagrams, graphs and even a full-page map are included, it would have been nice to have seen more general pictures, particularly of wildlife, to help bring the text to life and make it more engaging for the casual reader.

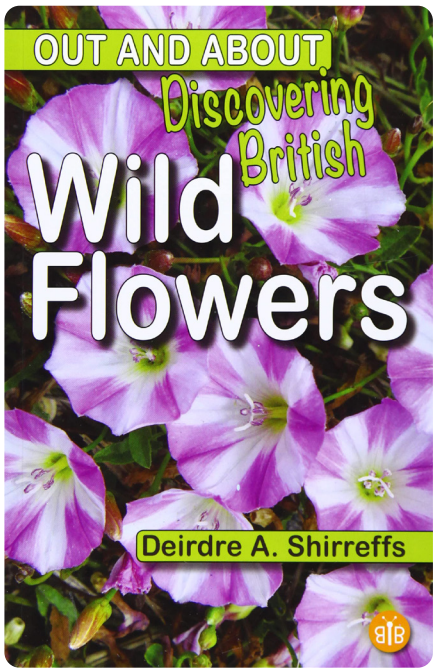
Despite this, the issues tackled by Spicer are more relevant than ever and this updated edition comes at a good time to inform and educate those already engaged in the open conversation regarding climate change, threats to biodiversity and the Anthropocene. I would recommend this book to those already interested in this topic who wish to expand their knowledge further, perhaps before studying A-level or a university course, even if it is unlikely to become their next bedside table page-turner.

Sarah Wood

Out and About: Discovering British Wild Flowers

Deirdre A. Shirreffs
Taunton: Brambleby Books, 2021
159 pp. £8.99
ISBN 978 1 908241 63 4

In October 2020, a proposal was made to the DfE, by the awarding body OCR, for a new natural history GCSE qualification. In the publicity, the CEO of OCR noted '*There's a gap in the curriculum that isn't encouraging a connection with the natural world, and at the same time … young people are very much engaged in the debate on the environment and they understand what their role should be and could be in protecting for the future*'. I think we can all agree that there is a need for greater environmental education in our schools, be it in



terms of a GCSE qualification or simply just making space in our busy curricula for some form of natural history education.

In this light, any publications aimed at improving students' knowledge and understanding of the natural world can only be a good thing. *Discovering British Wild Flowers* is aimed firmly at the younger age range (years 3–6, ages 7–11) but is, nevertheless, a very effective guide to over 100 common British wild flowers. The book serves as one means of encouraging a student connection with the natural world and does so in a very effective and engaging way. Given how little knowledge many of our students have about British natural history, and wild flowers in particular, this guide could be seen as a first step towards a meaningful engagement with the flora of Britain.

The guide is clearly written, uses colour photographs for identification and is organised by habitat (and also by colour using a colour chart). Information is given on height and type of pollination using a system of symbols. It is clear, concise and pocket sized, and includes additional information on plant and flower structure, pollination, fertilisation, seed dispersal and plant families. The identification photographs are of a good quality and the text, though brief, is clear and to the point with lots of useful information.

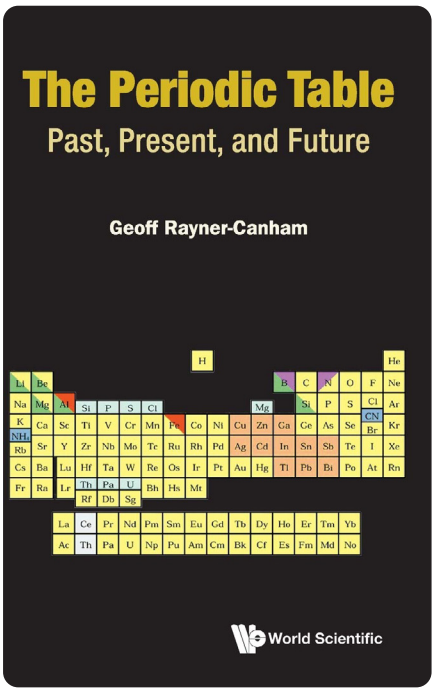
This is one for the school library and science department. The nature of the book makes it most suitable for years 7–9 (ages 11–14) but I could see it being used even with my year 13 (age 17–18) students. The last time we were on a field trip (remember those days!) my students did some work on dog's mercury – not one could identify the plant in the woodland! They could have done with this book.

All in all, a lovely little book and well worth the money. Here's to more like it and perhaps one day soon a GCSE in natural history, together with a second volume with another 100 species!

Peter Anderson

The Periodic Table: Past, Present and Future

Geoff Rayner-Canham
Singapore: World Scientific Publishing, 2020
312 pp. £85.00 (hardback); (e-book £29.95)
ISBN 978 981 121 848 4 (e-book 978 981 121 850 7)



Written by a chemist who is not only passionate about the elements and their properties but is also fascinated by the different ways in which the elements have been classified, this book aims to provide a 'new perspective' on the periodic table by looking at patterns and trends not usually focused on in other publications on this widely covered subject. Keen to go beyond lengthy factual compilations and away from the most obvious trends linked to groups and periods, the author starts with examining isotopes and nuclear patterns, electronegativity, oxidation states and electron affinity, before reviewing the various theories about the position of hydrogen in the table. A subsequent chapter then explores the dilemma surrounding which elements to place below scandium in periods 6 and 7. In the remaining ten chapters, he discusses, among others, topics such as the significance of 'isoelectronicity', some interesting patterns such as the 'Knight's Move' relationship and 'isodiagonality', and some chemistry of the lanthanoids and actinoids, before finally providing some thoughts on pseudo elements, such as the ammonium and cyanide ions.

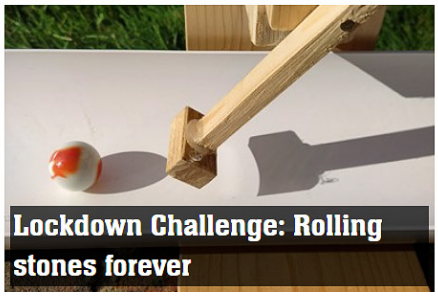
Frequently starting with a historical summary, specific examples are provided to illustrate the patterns and links described, leaving the reader to consider how they contribute to current thinking and how they can be utilised in predicting where we might look to learn from new relationships between elements or where we might find stable new elements and/or compounds in the future. I found the discussion on patterns in nuclear structure and their significance for the synthesis of new elements particularly interesting. The discussion of isoelectronic ideas, their implications for molecular shapes and the possibility of

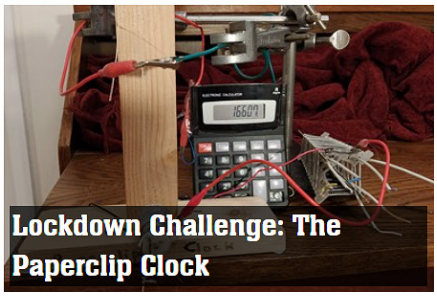

Lockdown Challenge: Rice and bean ski jump


Lockdown Challenge: Breath of fresh air


Lockdown Challenge: Making music with the saxotron


Lockdown Challenge: Beware of the falling teddy bears!


Lockdown Challenge: Rolling stones forever


Lockdown Challenge: The Paperclip Clock

predicting the stability of new compounds also provided me with ideas that I had not really considered before. However, moving away from the properties that provide 'perfect' examples of traditional group and period chemistry does result in what seem like some rather tenuous links that are difficult to explain and thus sometimes feel somewhat like a set of random facts.

Although it is clearly a valuable addition to the literature on Mendeleev's table, I struggle to decide who this book is really aimed at. It is definitely not a textbook (either for post-16 or undergraduate students) and neither should it be shelved under 'popular science'. Somewhere in between, it will appeal to teachers who already have a real interest in inorganic chemistry (and necessarily a secure knowledge of fundamental chemical principles) and who would like to broaden their knowledge and gain some new angles on which to base their teaching of periodicity. What is certainly true is that a reader who is prepared to invest the time in exploring this book will be left with much food for thought and with a real admiration for the erudition and enthusiasm of the author.

Janet Mitchell

Lockdown Challenge Online STEM activities

London: Institution of Engineering and Technology
https://eandt.theiet.org/tags/lockdown-challenge

Every man, woman and his or her dog has seemingly offered (in the pandemic era) an online version of whatever they normally do offline. The realm of STEM education is obviously no exception, but does benefit from a decent head start, given they tend to be pretty good at techy things already.

Science-you-can-do-at-home offerings on the web often seem to be aimed at more junior age groups, leaving the more tech-savvy older age groups a bit underwhelmed about floating a paperclip, bicarb rockets and the like. The IET (Institution of Engineering and Technology) *Lockdown Challenge* site manages to effectively avoid that criticism – and among the 30-plus suggested activities there will be challenges to tickle many a scientific fancy.

Some need very little in the way of gear. Turning your phone into a radar device just needs an oscilloscope app to be downloaded. Others (e.g. making a paperclip clock) are proper 'get bodging in the workshop' territory – the help/oversight of a responsible adult is advised.

I especially like the how-to for using a micro:bit for dead reckoning – useful for finding buried treasure or perhaps just determining where your folks parked the car. The strength of the resource is in its variety. Some activities might not float your boat, but that's OK. There is such a decent number of challenges, and the aforementioned variety, from meme-maker challenges (check out *Imgflip*) to the Boyle's Law Banger (ear defenders recommended), that even in this crowded online 'marketplace' there are still novel and intriguing STEM activities to discover and try out.

Ian Francis

ICO Equation Dice

Stephen Williams Design
www.icodice.co.uk
Cardboard version (ICO Student) £4.99; resin version (ICO Genius) £5.99; also available in group/class sets

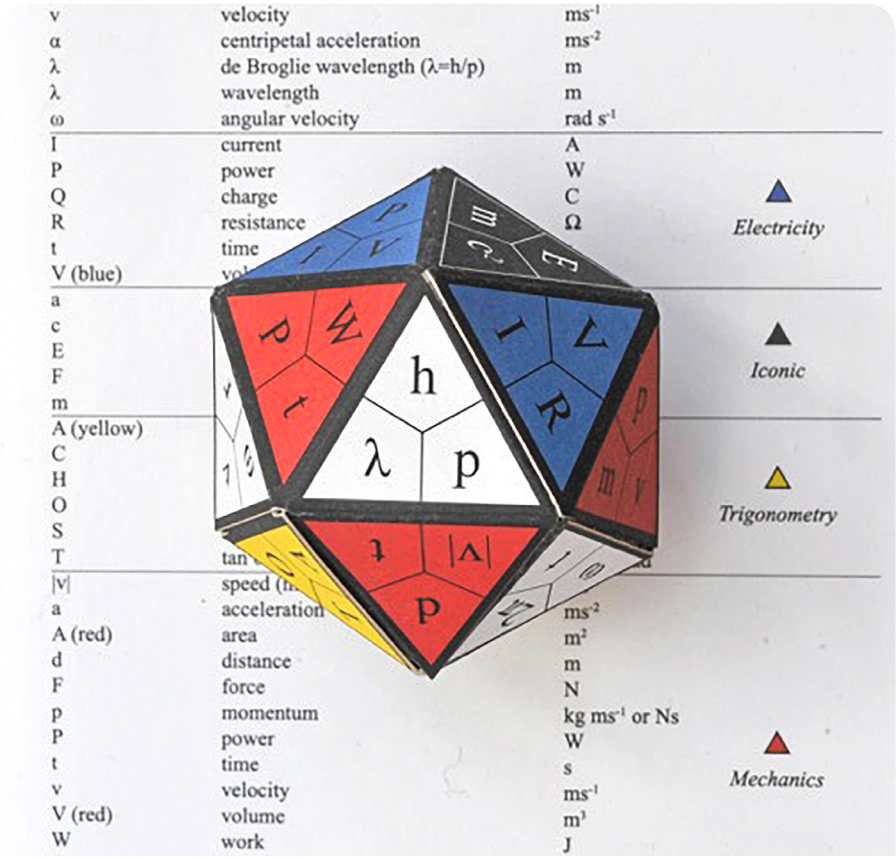
Love them or hate them, there is no denying that equation triangles work well for some students. Not only do they offer an easy way to identify correct rearrangements but they also provide a visual format that some students find

easier to remember than traditional linear equations.

This being the case, welcome Stephen Williams's *ICO Equation Dice*, which are three-dimensional representations of 20 common equation triangles. Two incarnations are available: the 'genius' edition is fabricated from solid resin whereas the 'student' edition is a self-assembly cardboard model that takes about 15 minutes to build. At about 4.5 cm, the multicoloured cardboard dodecahedron is considerably taller and more eye-catching than the monochrome resin version, which stands only 2 cm high.

My students were unmoved by the resin version but hailed the cardboard model as 'really cool' and immediately started asking about some of the equations that aren't in their own syllabus. Therein, however, lies a problem: much though students' curiosity deserves to be nurtured, I would rather have had 20 equations that are all in the current GCSE syllabus instead of including trigonometry and circular motion. Energy equations are particularly conspicuous by their absence; voltage, GPE, KE and work done are all missing.

Nevertheless, the students loved it and I can easily imagine inviting parents to roll the dice at open evenings as a way to start conversations about the physics syllabus at GCSE and beyond.



Assembled ICO 'student' cardboard die

In terms of value for money, I would suggest that the dice are almost too cheap given the very high-quality materials used, but my students disagreed. A price tag of £4.99 makes the cardboard model a bargain in my eyes but the students' opinion was that even half that sum would be a bit steep unless it came pre-assembled.

There is enormous potential in Stephen Williams's idea and his design and execution are outstanding. So even if they aren't quite perfect in terms of content, the *ICO Equation Dice* deserve to be purchased, both to stimulate classroom discussions and to engage parents. I can even imagine a future variant being offered in a presentation case to be awarded as a school physics prize.

Jon Tarrant

Reviewer

Peter Anderson is Head of Biology at Ampleforth College, North Yorks.
Ian Francis is a physics teacher and examiner.
Janet Mitchell is a recently retired chemistry teacher living in Surrey.
Jon Tarrant is Head of Sciences at Grainville School, Jersey.
Sarah Wood teaches biology in North West London.