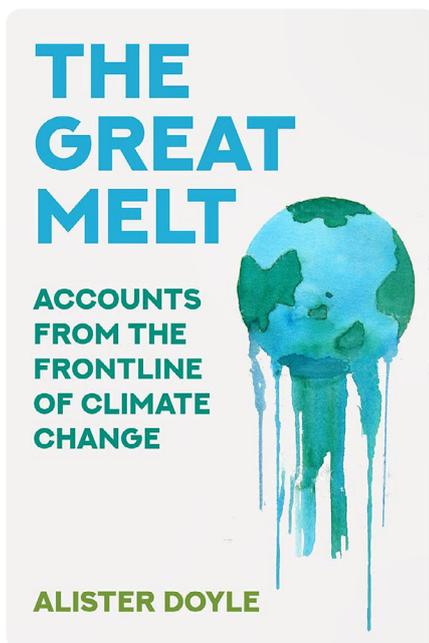


Reviews

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.

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The Great Melt: Accounts from the Frontline of Climate Change

Alister Doyle

Cheltenham: Flint Books, 2021

256 pp. £20.00

ISBN 978 0 7509 9784 3

As I was writing this review, the COP26 conference was drawing to a conclusion. Stakes were high going into the conference, as were the levels of cynicism and hope. The meeting, a follow-up to the 2015 Paris Agreement,

came at a time when the brutal, painful impacts of global warming are more obvious than ever: climate-intensified floods, fires and heatwaves affected millions worldwide in 2021. This year, if no other, has emphasised the need for immediate and drastic action to fix the underlying problems and help people adapt to changes already seemingly locked in. Sameera Savarala, a climate policy expert at the United Nations Development Programme, noted that COP26 has made progress ‘*but it’s not enough, and it’s not nearly fast enough*’.

So, Alister Doyle’s book, published to coincide with COP26, arrives and is another addition to the growing list of books about climate change; you may ask do we need another book on the subject? I think the answer is a self-evident ‘yes’, particularly when the book seeks to tell the stories of those at the frontline of climate change – the victims, the people affected. As a journalist who has covered climate change for two decades, Doyle is certainly an expert guide who

always writes with authority and great compassion.

His book seeks, in the main, to understand the processes of sea-level rise: how it occurs, why it occurs and, crucially, how it affects those living in affected parts of the world (now and to come). In each chapter, the author reports from a different frontline location, always letting the people speak, to provide a sense of place and history. In ten chapters, Doyle reports from Antarctica to the Pacific Islands and every chapter is imbued with a sense of how the people in these areas are affected by climate change and just how they feel about, for example, seeing their homes destroyed by rising sea levels. He has made a point of visiting some of the more remote places, noting in his foreword the thoughts of an outraged Solomon Islands delegate at a UN climate change conference in 2009. He was frustrated to see the huge, stylised globe hung in the conference centre that omitted his homeland: ‘*We need to be on that map*’, he said, and added some pencil dots. Doyle makes a point of adding his own

pencil dots and places some of these less well-known frontline locations centre stage in his book.

The author addresses the sceptics of climate-driven sea-level rise and describes the principle of post-glacial rebound that leads to some parts of the world actually rising. The book meets the issues head on and Doyle is unafraid to tackle some of the politics at the heart of this pressing issue. Ultimately, *The Great Melt* has the people and places at the centre of rising sea levels at its heart and makes a compelling case for urgent action; it is currently not happening fast enough. In his epilogue, Doyle writes '*time is fast running out, and there are alarming signs that an irreversible melt is underway at the ends of the Earth*'. This is an important book that everyone should read.

Peter Anderson



Strange Sea Creatures

Erich Hoyt

Ontario: Firefly Books, 2020

111 pp. £19.95

ISBN 978 0 2281 0297 7

Strange Sea Creatures is an exquisite book in which the author takes us on a largely photographic journey from the surface waters of oceans through the deep, dark waters to the bottom. This is one for the library shelf and will be sure to excite those students with even a passing interest in marine biology or the variety of life in general.

On our photographic journey through the various ocean depths, Hoyt provides an

expert commentary: we learn of bioluminescence, of stinging tentacles and chromatophores, encountering just a sample of the huge diversity of ocean life. As Hoyt tells us, a book covering all the animals found in the world's oceans would run to perhaps millions of pages, with many more species yet to be discovered and named.

This book is a joy to read and the photographs are simply magnificent. Many of the species are less than 3 cm across and would fit into the palm of your hand, but illustrate magnificently Darwin's oft-quoted thoughts on the '*endless forms most beautiful and most wonderful [that] have been, and are being, evolved*'. You will encounter species weird and wonderful on every page. Take the sea butterfly, for example, with its leaf-like 'wings', which feeds by secreting a mucus web to trap phytoplankton, or the dumbo octopus with its two fins that stick out like ears and flap when it swims!

The book also offers sobering reflections on the degradation of the oceans by mankind. Hoyt notes that we have never really paid attention to the depths of the oceans: indeed, the '*2020s and 2030s may be the last decades before all out exploitation ... along with climate change, turn the ocean into an empty polluted pond*'. It is up to us.

Peter Anderson

Your Plastic Footprint: The Facts About Plastic Pollution and What You Can Do to Reduce Your Footprint

Rachel Salt

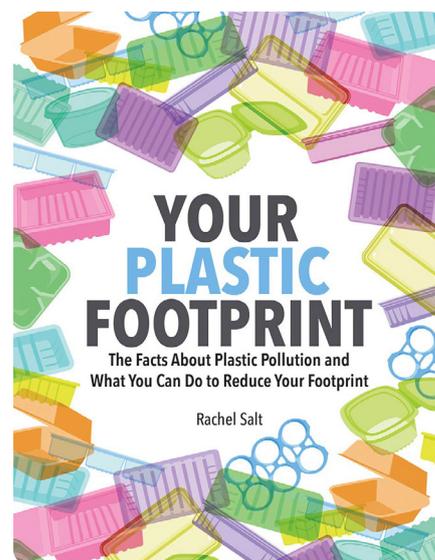
Ontario: Firefly Books, 2020

156 pp. £11.39

ISBN 978 0 2281 0310 3

This book consists of six chapters, going into detail about how our obsession with single-use or short-term-use plastic developed over the last few decades and the impact it is having on our world.

Salt provides an extensive level of detail about how the



production and disposal of plastic has a negative impact on our environment. This ranges from Chapter 2's content on the negative effects of oil extraction (e.g. fracking) to Chapter 4's various examples of how our daily reliance on plastic impacts our planet. This book presents a fascinating but cautionary analysis of our reliance on plastic and how we can make a difference. This is shown in Chapter 3's focus on providing solutions on varying scales and in Chapter 5's suggestions on how we can make an impact on both a personal and industrial scale.

This level of detail makes this book an essential piece for any school library but, unfortunately, not in any classrooms. Despite the level of detail provided in this book, there is little explanation of the scientific process of how plastic is made. Chapter 1 has a very brief introduction to the concept of polymer chains and polymerisation but not in enough detail for what is needed in OCR A-level chemistry. The same criticism applies to Salt's description of the different types of plastics produced, since, despite talking about strength and versatility, it does not provide explanations as to why these plastics have these properties.

In conclusion, this book is an essential read for any student

wanting to understand the impact that their plastic usage is having in this world, but do not expect it to help with their GCSE or A-level science exams. It would, however, be a great resource for students doing a project on environmental impact of humans.

Francis Jones



Human Impacts on Our Climate, Grade 6: STEM Road Map for Middle School

Ed. *Carla C. Johnson, Janet B. Walton and Erin Peters-Burton*
Arlington, VA: NSTA Press, 2020
156 pp. £31.00
ISBN 978 1 68140 408 0

Aimed at students at USA Grade 6 (age 11 on 31 August), this is a module in the STEM Roadmap curriculum series. It uses project-based learning to investigate a real-world context – in this case climate change – and then sets a problem to solve. The problem here is to find a possible solution that addresses one aspect of human activity that has contributed to climate change. Various options are suggested, such as calculating the waste or carbon footprint of their lunch and working out how to reduce it.

There is a schedule of 25 45-minute sessions, which divides into three ‘lessons’: *Weather versus climate and global warming trends* (4 sessions); *The greenhouse effect*

and global warming (6 sessions); and *Reducing your carbon footprint* (15 sessions).

Some resources are included, such as a self-assessment test to find out what students know at the beginning and at the end, and worksheets for a practical measuring the temperature of the gas in two large bottles as they are heated (one has carbon dioxide produced from sodium bicarbonate tablets). The online extras, which can be accessed by typing a word from a particular location in the book, are limited to colour versions of some of the images and climate-indicator graphs. There are resources, such as many videos that can be found on the internet, and most are relevant to the UK. When looking at the local weather for your school, you would need to use a UK site such as the Met Office or the BBC, and the activity looking at temperature in US cities would need to be changed – both from Fahrenheit to Celsius and to locations more relevant to your students.

Many young people are concerned about climate change. There are many misconceptions, and this project addresses a large number of these. Many young people want to do something about climate change and feel helpless. This project shows them that, in small ways, they can make a difference. Once they have worked out their solution they present it to their class, to the school or the community. As the project suggests, if the school is agreeable, solutions such as composting or recycling on a school basis might be adopted.

If you are thinking of introducing a STEM-based project along these lines, especially for years 6 or 7 (ages 10–12), with a real context of concern to young people, this book will give you the framework you need and some of the resources to get you off to a good start.

Carol Tear



Creating Engineering Design Challenges: Success Stories from Teachers

Ed. *Helen Meyer, Anant R. Kukreti, Debora Liberi and Julie Steimle*
Arlington, VA: NSTA Press, 2019
191 pp. £47.53
ISBN 978 1 68140 698 5

There is much to recommend in this book but it is probably best not to start at the beginning.

Part 1 reads like an academic assessment of the Cincinnati Engineering Enhanced Mathematics and Science (CEEMS) initiative, which drove the teacher-training programme to develop classroom engineering challenges, as detailed later in the book. This information is relevant background but it did not engage me, despite the importance of an appropriate ‘hook’ being stressed elsewhere to foster engagement when presenting challenges to students. With that in mind, I suggest that readers should begin with the first six or so pages of Chapter 8, titled *Getting started with design challenge units*.

CEEMS is a challenge-based learning initiative that encourages students to tackle real-world problems. Its approach is familiar but the authors claim their unique slant is the addition of an engineering design process showing ‘*how engineers solve problems*’. This is clarified in Table 1.1, based on the work of Rodger Bybee, which

categorises science as the provision of explanations to answer questions, and engineering as the construction of design solutions to solve defined problems. (The original source is well worth reading but the published link is broken, so use https://static.nsta.org/ngss/resources/201112_Framework-Bybee.pdf instead.)

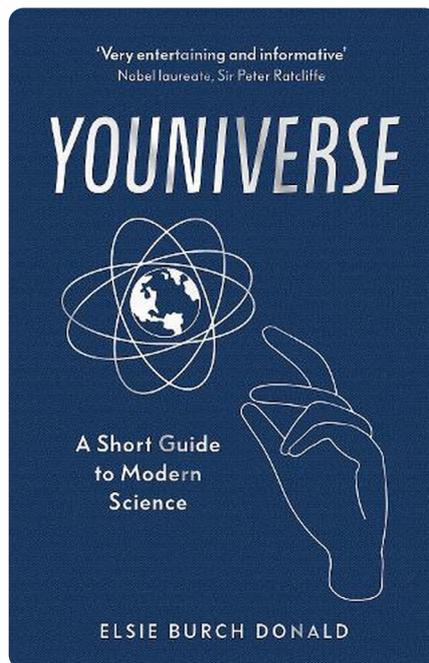
The most useful part of the book is Chapter 6, which focuses on assessment and covers three challenges in considerable detail. There is a lot of excellent lesson material here for secondary classrooms but also a few minor niggles. The use of non-SI units stands out like a sore thumb and I am not keen on the title '*One Shot, One Kill*' when referring to a projectile challenge to hit the teacher with a water-balloon slingshot. But it is the instruction to students to '*keep as many decimal places as possible*' that really jars.

By coincidence, I read this book while guiding a team of my own students through a local engineering challenge organised by Ports of Jersey and I found myself agreeing with many of the authors' comments. In particular, it is important to consider whether '*students see this ... fitting into their worldview, or is it just something their teacher wants to do?*' and to reframe students' efforts as an evaluation of different solutions rather than a search for the 'right answer'. With these things in mind, I would dearly have loved to have seen in the book an example of the concept maps produced by Marie Pollitt's students.

It is not easy to bring engineering into the classroom and this book will definitely help teachers to do so, but it is not an off-the-shelf

toolkit for success so much as a record of projects that have already succeeded. To find out more, browse the rich variety of resources available online (https://ceas.uc.edu/special_programs/ceems/CEEMS_Pathways/SIT/CEEMS_InstructionalMaterials/ScienceUnits.html) and then, if you like what you see, buy this book for details about implementation.

Jon Tarrant



Youniverse: A Short Guide to Modern Science

Elsie Burch Donald
 Richmond: Duckworth Books, 2021
 226 pp. £9.99
 ISBN 978 0 71565422 4

A highly accessible read with three main sections: *What are you?*, *Who are you?*, and *Where are you going?*

The first section starts in the physical sciences and steadily shifts to the life sciences. As a teacher of the former, the first part of the section felt like dutifully going through the motions. Indeed, I was unfortunately set on edge early on with Figure 1, the classic diagram of

the nuclear atom. This shows three electrons in orbits around a nucleus composed of three neutrons and four protons. (However, I couldn't remain bothered for too long: who cannot warm to turns of phrase like '*Chemical bonds glue atoms together. The job is done by flibbertigibbet electrons?*') Despite my earlier ennui, the biological sciences that form the remainder of *What are you?*, and pretty much the entirety of the following *Who are you?* section, had me trying my best to file away in my brain snippets such as modern humans sharing 99% of our genome with Neanderthals. I was suitably impressed as I was then more like the intended reader. Presumably, in a reversal of roles, a biologist would have been impressed with *Matter and mortar, movers and shakers* (energy) and *Another world* (particle physics), and less wowed later on with *Cells, genetics and evolution*.

Irrespective of any subject boundary considerations, the final section, *Where are you going?*, has plenty of food for thought, whatever one's scientific background or level. The future is portrayed as a contest between genetic engineering and artificial intelligence. From a myriad of possible future trajectories (with the caveat that the future could just be fundamentally unpredictable) the frontrunners could be superhumans and AGI (artificial general intelligence)-equipped robots.

Given that the book is a simple introduction to the basics of modern science, it is one for interested readers of all ages. Even the more science literate will find worthwhile ideas to take away, and the book is certainly worth adding to the school library.

Ian Francis

Reviewers

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