

From the Solar Constant to Thong Bikinis and All Stops in Between

A review of: “Sun Protection: A risk management approach” by Brian Diffey. IOP Publishing, Bristol, UK, 2017. ISBN 978-0-7503-1377-3 (ebook) ISBN 978-0-7503-1378-0 (print) ISBN 978-0-7503-1379-7 (mobi).

Leo Szilard was one of half a dozen or so physical scientists who, having attended the same Budapest gymnasium, revolutionised 20th century physics. In 1934, whilst working in London, he realised that if one neutron hit an atom which then released two further neutrons, a chain reaction might ensue. Fearing of the consequences, he tried to keep the discovery secret by assigning the patent to the British Admiralty. In 1939, he authored the letter, that Einstein signed, warning the then US President of the coming impact of nuclear weapons.

After the war, in revulsion at the uses to which his physics had been applied, he swapped physics for biology. There was a drawback, however. Szilard liked to think in a hot bath, and he liked to think a lot. Once his interests had turned to biology he remarked that he could no longer enjoy a long uninterrupted bath – he was forever having to leave his bath, to check some factual detail (before returning to think some more). Biology seemed to lack the deep simplifying foundations of the Queen of Sciences.

This cameo is germane to the present book, authored by Professor Brian Diffey, a celebrated medical physicist, who has spent his career working in the extracellular space between physics, skin biology and that branch of natural history that accounts for most of clinical dermatology. It is all too easy to imagine that if you are at ease with some rudimentary mathematics, there are only a few powerful physics principles that you need to know, and that it is just the dermatology that supplies all the messy details. On the contrary, what this book clearly demonstrates is that if you want to think in this interdisciplinary space, the critical details are everywhere: in both the physics and the biology, as well as in those mysteries of human behaviour and human choice. As has so often been stated, if the physical constants of this universe were slightly different, it would have been a universe without life. What this book makes clear, is that it is impossible to reason about ultraviolet radiation and human health without a veritable encyclopaedia of details about the natural and human world, and the value of those constants. The author leaves us in no doubt, that if we are going to advise patients and populations on how ultraviolet radiation impacts on their health, we need to be as intimate with the solar constant as the thong bikini.

The book although modest in length covers all that any dermatologist or skin biologist could wish for: the fundamental physics of optical radiation; the problems of measurement; the short and long term effects of UVR on skin; the science behind sun protection; and the changing geography of human exposure to ultraviolet radiation. We are shown the big world picture of the changing ice caps through to the details of the UVR attenuating effects of the different windows in a single modern car (the front, sides and rear, differ, I learn). It is facile to say that much of this information is available by reading primary research papers: no one has collected this information within a single readable volume that is accessible to people from very different backgrounds. The book is not just suitable for biologists and dermatologists, but will be of interest to physical scientists and those working in the skin care industry (even those in marketing).

Despite the wide potential readership, I will make some special pleading for my own tribe, be that of clinical dermatology or skin biology. Diffey tactfully points out that misinformation (fake news!) in this domain is widespread. He even provides examples (without naming the names) of dermatology experts who get the basics wrong – often in print. Many of us too have been frustrated by the errors that have crept into ‘public health advice’ promulgated by those with little familiarity with the underlying science: there is the usual clickbait of UVA for ageing and UVB for burning; the belief that UVR-induced burning is a single coherent endpoint; and biological models that use levels of UVR that might apply in outer space, but (thankfully) not on this Earth.

It is interesting to wonder why such errors are so widespread (and to which this book will surely act as a germicidal agent against). One reason is surely that in this domain of knowledge it is almost impossible to say anything meaningful without detailed reference to the exact action spectra of whatever you are interested in. And many of these spectra are far from linear or smoothly changing. This means that it is hard to make simple summary generalisations that are accurate without calculations based on the optical distributions. Before you next pretend that only UVA penetrates to the dermis, or that it is only UVB that varies seasonally, take a look at the figures in this book. Even Szilard would be happier now, his bath less disturbed: he could use an iPad and the digital version of this book in the bath.

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