

subjects are less familiar; this is true, for example, of the brief mention of the invention of sun cream and Ambre Solaire (p. 101). The conclusion, drawing heavily on Science and Technology Studies and in particular on Actor Network Theory, is perhaps the most disappointing section, focusing on what it terms “helio-humans”. Thus Carter argues that “the body in sunlight is always mediated by the sociotechnical assemblages surrounding it . . . the continuing and changing relations of bodies to their environments continue to be influenced by . . . residual figurations” (p. 110). This is really a work of synthesis, and at times an uneasy mix of social history and sociology. But generally this is an attractive and well-written book, offering well-organized if brief summaries of interesting aspects of this history.

Richard Hobday’s *The light revolution*, on the other hand, is really about how to use sunlight to promote health in the built environment. His argument is that artificial light has an impact on physiological and psychological well-being, through depression, vulnerability to super bugs, and Vitamin D deficiency. Hobday deploys some historical evidence in support of this argument—Greeks and Romans; Florence Nightingale; public health; the debate over rickets; and the preoccupation with the sun seen in the work of modernist architects such as Alver Aalto. Nevertheless the tone is relentlessly strident, and, while the book offers a summary of the recent (mainly clinical and biomedical) literature, the failure to include either footnotes or endnotes means that the source for many of the statements made remains elusive. Hobday is desperate to prove his argument, and this leads to much repetition. The evidence for Seasonal Affective Disorder (SAD) remains unclear, with Hobday admitting the research is “in its early stages” (p. 30), while his call for the promotion of sunbathing seems to run counter to most of the medical evidence.

A wide range of health problems—heart disease, sleep disorders, and cancer among others—are linked to lack of sunlight. Moreover Hobday’s focus on Vitamin D deficiency leads him to downplay the role of diet in the interwar discussion of rickets, along with the issue of

malignant melanoma more recently. The section on architecture and street design is perhaps the most interesting, covering the work of Le Corbusier, Mies van der Rohe, and Maxwell Fry among others. Hobday has an important and interesting argument—that there should be a greater appreciation of natural light and direct sunlight on the part of designers and legislators—but his historical material is largely marshalled in support of this central thesis, and for that reason the book is of limited interest to the readers of this journal.

That said, postgraduate students searching for a suitable thesis topic could usefully be directed to these books, particularly *Rise and shine*. Together they suggest the untapped potential of historical research exploring the history of our attitudes towards the sun and sunlight.

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Jeremy A Greene, *Prescribing by numbers: drugs and the definition of disease*, Baltimore, Johns Hopkins University Press, 2007, pp. xv, 318, £33.50, \$49.95 (hardback 0-8018-8477-2).

In the second half of the twentieth century we have witnessed the emergence of a new model of disease based on numerical deviations rather than symptoms and treated on a preventive basis before any overt signs of illness develop. This concept of treating healthy patients is not a recent product of genetic medicine but arose gradually in concert with the development and use of a set of safe, effective and highly marketable prescription drugs. Jeremy Greene uses the careers of an antihypertensive, an antidiabetic and a cholesterol reducing agent to show how this rather “insidious” paradigm shift in American health care has come about.

Greene’s historical journey starts with the development and introduction of the first palatable pill for hypertension, chlorothiazide or Diuril® in 1958. Diuril, however, did not develop out of any targeted search for an antihypertensive therapy. The drug did not even have any connection with hypertension until it

had left the company's research laboratories. Rather, Diuril was meant to start its career as a novel diuretic agent; as a product of Merck Sharp & Dohme's Renal Program. Diuretics were known to capture a substantial market with many therapeutic indications—though hypertension was not among them. The subsequent transformation of Diuril from a diuretic into an antihypertensive drug illustrates in a prototypic way the mutually constitutive processes of research, clinical practice and medical marketing in American medicine in the second half of the twentieth century.

By the time of Diuril's launch, clinical research was clearly understood in explicit relation to marketing at Merck Sharp & Dohme (MSD). Clinical research was intended both to generate data for the more convincing promotion of Diuril and to serve as a promotional structure in itself. The marketeers divided clinician-researchers into a marketing structure with two concentric spheres. The outer ring involved lesser-known researchers of negligible influence, while the core consisted of a group of highly influential leaders in the field, who acted as models for their peers in their endorsement of a product.

Diuril's road show, as Greene aptly calls the polished and penetrating promotion campaign, included symposia and publications featuring Diuril in peer-reviewed journals and the so-called "throwaway journals", the medical newsmagazines and the firm's house organ. In addition, MSD marketing staff deployed journal advertisements, direct mail and sales representatives to visit individual doctors. As a visual aid and as part and parcel of a unidirectional gift economy, the company used an idealized dynamic image of fluid physiology, the iconic figure of the so-called "Diuril Man". Moreover, MSD publicists set out to persuade some of the best-known science writers of the day to write special interest stories for publication in newspapers and newsmagazines. The ultimate objective of this information bombardment was to raise physician and consumer awareness of both drug and disease. To test the effect of the marketing strategy on everyday clinical practice, physicians' prescribing habits were closely

monitored. Going by the record-breaking sales of MSD's first blockbuster drug, the Diuril campaign worked out rather well, and would become a template for the promotion of therapeutic drugs in America.

Greene calls it ironic that the subsequent decline and neglect of Diuril and its clones in the decades following their initial brand-name glory was due to the emergence of newer generations of hypertensive agents that used precisely the same promotional structure. But it was ever thus. Drug career cycles generally encompass three phases: first, an expanding use, accompanied by high expectations; then, rising criticism and disappointment; and finally contracting use and limited application. These phases need not be sequential: they often overlap. Drug promotion as rooted in both education and salesmanship can be regarded as an integral part of this cyclical economy of drug development and use, and in a broader sense the cyclical economy of American medicine. Another weakness of the book is the absence of a cross-cultural perspective. Are we confronted with a typical American development or, as the British poly-pill promotion at the end suggests, with a more universal therapeutic transition?

In the process of circulating between bench, bedside and the public sphere not only the multiple identities of Diuril as a research object, medical tool and commodity changed but so did its handlers and the disease they tried to tame. After the introduction of Diuril, hypertension would become a category incommensurate with the hypertension that came before; the disease was redefined in terms of numerical thresholds and clinical guidelines ranging from mild, moderate up to severe. Subsequently, in following the conjugated careers of Orinase and diabetes as well as of Mevacor and cholesterol, Greene shows convincingly that our notions of diagnosis, prognosis and therapy co-evolve.

I heartily recommend this book, which rightly emphasizes that the genesis of the pharmacotherapy of risk cannot be reduced simply to a clever marketing effort. It is important to realize that the everyday practice of "prescribing by numbers" has propagated a new moral economy of health values and a new set of surveillance

structures with profound but still poorly understood implications for our health care at the dawn of predictive medicine.

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John E Lesch, *The first miracle drugs: how the sulfa drugs transformed medicine*, Oxford University Press, 2007, pp. xi, 364, £35.99, \$59.50 (hardback 978-0-1951-8775-5).

The history of the sulfa drugs is one of those that have been overshadowed by other stories for quite some time. In the historiography of anti-infective therapies the sulfas have been dwelling in the shadow of fungal antibiotics and of the assumption that it was with the latter that the therapeutic revolution got started during the Second World War. In a more peculiar way the historiography of these medicines has also suffered from a somewhat hagiographic focus—thereby reducing the history of a whole class of drugs to the biography of Gerhard Domagk, a German medical researcher who in 1939 was awarded the Nobel Prize for his work on prontosil, the first of these medicines. As Lesch makes clear, however, this is a truly misleading picture. The sulfa drugs, derived from so-called azo-dyes, should better be understood as being part and parcel of a system of invention that had developed in the German pharmaceutical industry from the late nineteenth century. In the specific case of prontosil, Bayer (later part of I G Farben) had pursued a research and development strategy on anti-infective therapy from pre-First World War days. Heinrich Hörlein, a trained chemist, managed this research, bringing together medical people like Domagk with chemists like Joseph Klarer and Fritz Mietzsch. It was meant to be a long term involvement and that was indeed what was needed. What started as an industrial system of invention inspired by Paul Ehrlich's views on chemotherapy well before the Great War made very little headway in the 1920s. Thus, the molecule that finally was marketed as prontosil from 1935 onwards

encountered the widespread scepticism that had resulted from the futile search for Ehrlich's magic bullets. Eventually, the medicine turned out to be effective against such conditions as pneumonia, gonorrhoea and others. Lesch carefully reconstructs the reception in major national drug markets like France, Germany, Great Britain and the US in the late 1930s. For example, in France the introduction of sulfa drugs was slowed down because they were perceived as a threat to a major asset of the nation's pharmaceutical industry, therapeutic vaccines.

However, after some hesitation the sulfas got off the mark and with them, as Lesch argues, the therapeutic revolution of the mid-twentieth century. The Second World War cut off the German industry from its export markets while at the same time providing a powerful stimulus for the development of more such medicines in other countries. By the end of war there were literally thousands of known therapeutic molecules of this class and quite a few of these had been successfully marketed as medicines. Lesch singles out the example of sulfapyridine, popularly known as M&B 693, developed by the British company May & Baker, and follows in some detail the trajectory of this drug. That the sulfas sparked the therapeutic revolution is not only connected to the fact that they were actually the first of a series of "miracle drugs" that came to be invented between the 1930s and the 1960s, but also that other typical features of that historical phenomenon such as standardization of medical practice and a close link between medical and industrial technologies are shown to be present in their history.

Lesch's story essentially closes in the immediate aftermath of the Second World War. It is based on scrupulous and exhaustive archival research and an admirable command of scholarly sources. Although some passages are a demanding read for those with little or no knowledge of chemistry, it is certainly not a specialist account. Instead it is a true eye-opener on the role of sulfa drugs in mid-twentieth-century medicine, placing them firmly in the context of the larger histories of science, medicine and pharmacology. It looks likely to be