

the product, whereby everything seemed to proceed quite smoothly — apart from some legal troubles and minor technological problems. The book would have profited from grappling with recent theories and studies in the history of pharmaceuticals. In particular, the so-called “biographical approach” propagated by Sjaak van der Geest and others might have offered the possibility of an interaction of the two “biographies,” which now stand quite unconnected side by side. Besides this lack of contextualisation of his history in regard to recent work done on pharmaceuticals in the twentieth century, Haas also does not bring the history of Windaus and Vigantol in touch with current research on the history of the pharmaceutical industry during the Third Reich, concerning which some hints regarding the role of I. G. Farbenindustrie during that time would have been particularly desirable.

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BEAT BÄCHI

Kampfstoff-Forschung im Nationalsozialismus: Zur Kooperation von Kaiser-Wilhelm-Instituten, Militär und Industrie. By FLORIAN SCHMALTZ. Pp. 678, illus., index. Wallstein Verlag: Göttingen. 2005. €39.00. ISBN: 3-89244-880-9.

In *Kampfstoff-Forschung*, the historian Florian Schmaltz investigates the research projects on chemical weapons by six institutes of the Kaiser-Wilhelm Society during National Socialism (NS). With the Kaiser-Wilhelm Society, Schmaltz focuses on the leading German association for scientific research, but he also analyses the cooperation of the institutes with institutions of the NS state, the chemical industry, and the military.

Starting with the Kaiser-Wilhelm Institute of Physical Chemistry, Schmaltz shows how a group of Nazi “Old Fighters” took over the institute, when Fritz Haber had to leave in 1933. The inorganic chemist Gerhart Jander established research on chemical weapons in the institute until Peter Adolf Thiessen, a physical chemist, succeeded him as director in 1935. Thiessen undertook research on an explosive known as “N-Stoff” (chlorine trifluoride) and on poison gas. In this process, he focused on improvements to its use and possible defence measures against it, and made poison gas research a central project of the institute during the late 1930s and the war years.

Thereafter, Schmaltz discusses temporary projects at the Kaiser-Wilhelm Institutes on “Occupational Physiology,” “Brain Research,” “Marine Biology,” and “Leather Research,” which were mainly occupied with perfecting gas masks, clothing and shoes as protection against weapons such as mustard gas.

Schmaltz also investigates the Kaiser-Wilhelm Institute for Medical Research in Heidelberg, which was headed by the Nobel Prize laureate Richard Kuhn from 1937. In cooperation with the military, Kuhn established a special department for research on chemical weapons and their effects, which was continuously pursued during the Nazi regime. In 1944, Kuhn and his collaborators accomplished the synthesis of an effective acetylcholinesterase inhibitor and a deadly nerve gas, called *Soman*. Despite being synthesised in relatively large amounts, it was — like all other chemical weapons — not used during World War II, probably for the reason that it was impossible to protect German soldiers and civilians from these poisons.

Schmaltz clearly shows that Thiessen and Kuhn were authoritative science administrators who coordinated much of the chemical research in the Third Reich. After the establishment of a central research council on war preparation in 1937, the Reichsforschungsrat, Thiessen and Kuhn were appointed as directors of its respective chemistry departments. In that function, they decided about chemical research by government institutes, Kaiser-Wilhelm Institutes, and universities, funded by the Reichsforschungsrat.

Schmaltz presents important insights into the six Kaiser-Wilhelm Institutes that were directly involved in research on chemical warfare in those years; these shed much light on the functioning of the Kaiser-Wilhelm Society in general during the Third Reich. Moreover, he clearly shows the “cooperative relations between science, the military, industry and the NS state,” which were necessary to for research on and development of poison gas.

The voluminous book is meticulously researched and clearly structured, and contains numerous footnotes. Schmaltz offers a highly informative and far-reaching addition to our knowledge of the involvement of chemists in war-related research, which served the Nazi regime as well as their self-interest. Therefore, the book should appeal not only to all those interested in chemical warfare, or in the history of the Kaiser-Wilhelm Society, but also to historians of science and technology, and to historians of the twentieth century in general.

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Penicillin: Triumph and Tragedy. By ROBERT BUD. Pp. ix + 330, illus., index. Oxford University Press: Oxford. 2007. £44.00 (hbk); £17.99 (pbk). ISBN: 978-0-19-925406-4 (hbk); 978-0-19-954161-4 (pbk).

Robert Bud explains the rationale behind the title of his book in his Introduction. As he points out, since the introduction of penicillin during World War II, for those suffering from an infectious disease the relief on receiving a prescription for penicillin brought with it the certainty of recovery. However, from penicillin's "triumphant" beginning, just over sixty years later, a darker penicillin story has emerged. Penicillin and other antibiotics that were developed later are failing in the struggle with methicillin-resistant *Staphylococcus aureus* (MRSA). Within this scenario, we have the "tragedy" of penicillin, and it is a tragedy caused by ourselves.

To begin, the author highlights the 1930s, when suffering from acute infection was widespread in Western societies. Using statistical evidence from Britain and the USA, he shows that "preventive measures" such as efficient sewage disposal and clean water brought health improvements, while movements such as the British Boy Scouts and American Health and Happiness League promoted "clean" behaviour. This model of self-prevention was complemented by a growing pharmaceutical industry producing radically new medicines such as sulfonamides.

This was the world into which the "wonder drug," penicillin, was introduced. The history of penicillin remains iconic, and Bud relates the British-US development of penicillin well. In order to do so, he weaves his way from one source to another, and, while not strictly in chronological order, his methodology is easy to follow for the newly forming world of biotechnology and the "branding" of penicillin at the end of World War II.

The Anglo-American story is expanded by introducing the wartime and post-war experiences of other countries in their quest for penicillin, namely Germany, Czechoslovakia, The Netherlands, France, China, Japan, Russia, and Italy, albeit some more fully than others. In so doing the author also shows the quick spread of Allied penicillin production techniques and the post-war fear of epidemics.

The deep changes across technology and industry that followed World War II have become known as the "Third Industrial Revolution," and according to Bud it was penicillin that drove these changes. In the "penicillin age," the demand for penicillin and its successors, such as the broad-spectrum antibiotics methicillin and amoxicillin, spiralled.

Regarding the post-war era, this volume highlights the debates taking place in the political, industrial and economic spheres of Britain and the USA regarding the consequences of under-consumption or overconsumption of penicillin. Some cultural differences in patient demand in Scandinavia, The Netherlands and Spain are discussed, but British and US sources remain the core of this volume.

The debate on overuse is further fuelled when the author shifts attention from the surgery to the farmyard and the use of penicillin in intensive animal husbandry. This chapter, in particular, gives new insights into the use and misuse of antibiotics.

The Conclusion highlights the fact that the problem of bacterial infection has not been completely eliminated. Bacteria have shown themselves to be adept at self-defence, as the